NCID API Documentation

API 1.13
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This document contains information needed to develop servers, clients, client output modules and gateways for NCID (Network Caller ID).

All example phone numbers and names contained herein are intended to be fictional.

There are 5 feature sets of NCID conformance:

- Feature Set 1: Modem and Device Support (required)
- Feature Set 2: Gateway Support (optional)
- Feature Set 3: Client Job Support (optional)
- Feature Set 4: Acknowledgment Support (optional)
- Feature Set 5: Relay Job Support (optional)

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Before you begin

ABOUT CONFIGURATION OPTIONS FOR SERVER IMPLEMENTATIONS

This API document attempts to describe server interactions with gateways, clients, extensions, etc. without regard to a specific operating system or specific programming methods and conventions. However, for the purpose of reading this document we will reference configuration options using the following convention:

<configuration file name::setting name>

In the case of the official NCID distribution for Unix/Linux platforms, there are several configuration files. Here are just a few of them:

Purpose	*Unix/Linux File Name*	*Convention used in this API*
Server settings	*ncidd.conf*	***<ncidd.conf::setting name>***
Alias mappings	*ncidd.alias*	***<ncidd.alias::alias definition>***
Blacklist	*ncidd.blacklist*	***<ncidd.blacklist::call name or number>***
Whitelist	*ncidd.whitelist*	***<ncidd.whitelist::call name or number>***
Universal Client settings	*ncid.conf*	***<ncid.conf::setting name>***
SIP Gateway settings	*sip2ncid.conf*	***<sip2ncid.conf::setting name>***
YAC Gateway settings	*yac2ncid.conf*	***<yac2ncid.conf::setting name>***
XDMF Gateway settings	*xdmf2ncid.conf*	***<xdmf2ncid.conf::setting name>***

An example of a setting name in the server configuration file would be `lockfile` *. Within this document you would see the setting referenced as* ***ncidd.conf::lockfile****.*

If a developer wishes to create his or her own NCID server, any configuration file name and setting name convention desired can be used. For example, an NCID server for Windows might use a file name called ***ncid-server.ini*** *and a setting called* ***LockFile=****.*

Using the ***<configuration file name::setting name>*** *convention allows a developer to correlate the setting names referenced in this API with the developer's own conventions. In this regard, you can think of* ***<configuration file name::setting name>*** *as a reference to a concept or definition.* ***ncidd.conf::lockfile*** *therefore refers to the path of the server's serial port lock file. An alphabetized summary of all server options, including a brief description, can be found in Appendix C: Quick Reference List of all server configuration settings.*

ABOUT END-OF-LINE TERMINATORS

Carriage return characters may appear in this document as <CR>, x0D, or \r. Line feeds a.k.a. new lines may appear as <LF>, <NL>, x0A, or \n.

Because of NCID's Unix origin, generally speaking, line feeds are the preferred line terminator. This applies not only to client/server communications but also to reading files (e.g., ***ncidd.conf****,* ***ncidd.alias****,* ***ncid.conf****,* ***ncid-mysql.conf****, etc.) as well as writing files (e.g.,* ***ncidd.log****,* ***ncidd.alias****,* ***cidcall.log****, etc.).*

Even though line feeds are preferred, the Unix distributions of NCID will generally play it safe and look for both <CR> and <LF>, stripping these characters prior to storing data in memory or otherwise processing the read/received data. In other words, NCID does not enforce which end-of-line terminator is used when reading files or receiving data, it just requires a minimum of one (<CR> or <LF>) to be used.

The exception is when NCID must write or send data to third party hardware, processes, or protocols. In these cases, third party requirements will dictate the end-of-line terminators to be used. NCID already takes this exception into account for all officially supported third party interactions.

ABOUT LINE TYPES AND FIELD PAIRS

The reason for the following restrictions is to allow future NCID programs and scripts to be as backward compatible as possible. This is particularly important in the case of third party software that may not be updated at the same time as a new NCID release.

Line Types

- *This document uses XXX, XXX:, XXXLOG:, etc. where XXX is a place holder when discussing something that applies to multiple line types.*
- *It is very important for a program or script to ignore line types (e.g., 200, 210, CID:, HUP:, REQ: etc.) that it does not recognize. It should not trigger a fatal error.*

Field Pairs - Overview

- *A field pair is defined as <field label><field data>, with zero or more delimiter characters between them.*
- *The very first field pair for a line **might** begin with the three characters ### to indicate the data is being sent TO the server, or begin with the three characters *** to indicate the data is being received FROM the server.*
- ***It is very important NOT to assume that the order of field pairs will always be the same across NCID versions.***
- *For example, if today a hypothetical layout of field pairs looks like this:*

```
XYZ: ***DATE*<date>*TIME*<time>*LINE*<lineid>*NMBR*<number>*MESG*<hexchars>*NAME*<name>*
```

- *There is no guarantee that the order won't be changed. Perhaps a future version would swap MESG and NAME:*

```
XYZ: ***DATE*<date>*TIME*<time>*LINE*<lineid>*NMBR*<number>*NAME*<name>*MESG*<hexchars>*
```

- *Another example showing ###/.../+++ field delimiters for the field pairs:*

```
ABCD: ###DATE<datetime>...CALL<type>...LINE<lineid>...NMBR<number>... NAME<name>+++
```

might someday get changed to put NMBR and NAME first:

```
ABCD: ###NMBR<number>...NAME<name>...DATE<datetime>...CALL<type>... LINE<lineid>+++
```

- *Any programs or scripts you develop on your own must be flexible in parsing out <field label><field data>, wherever they might be located in a line.*
- ***It is very important for a program or script to ignore <field label><field data> pairs that it does not recognize. ***
- *For example, if at some point in the future a new field pair with the hypothetical label of JJJJ was added, your programs or scripts should not trigger a fatal error. And it might be added at any location in the line, not just at the end:*

```
XYZ: ***DATE*<date>*TIME*<time>*LINE*<lineid>*NMBR*<number>*JJJJ*<data>*MESG*<hexchars>*NAME*
<name>*
```

```
ABCD: ###DATE<datetime>...CALL<type>...LINE<lineid>...NMBR<number>... JJJJ<data>...NAME<name>+++
```

- *It is expected that if a field label is present there will also be field data.*
- *Do not leave <field data> empty (null). Although this is not strictly enforced you may get unpredictable results. The best practice is to use the special reserved word or phrase assigned to a field pair for this purpose. For example, the <field data> for an unknown NAME should be NO NAME; for an unknown NMBR use NO-NUMBER.*
- *Clients should allow for the <field data> to be a single dash to suppress the text from being displayed, that is, if <field data> contains a dash don't show anything.*

Field Pairs - Frequently Used

Click on a link to be taken to its definition.

Field Label	*Description*
DATE	*date*
TIME	*time*
LINE	*phone line identifier*
NMBR	*phone number*
FNMBR	*formatted phone number (new in API 1.11)*
NTYPE	*phone number's device type (new in API 1.11)*
CARI	*phone number's carrier name (new in API 1.11)*
CTRY	*phone number's two-letter uppercase country code (new in API 1.11)*
LOCA	*phone number's location within the country (new in API 1.11)*
NAME	*caller's name*

GUIDELINES FOR CALCULATING CALL DURATION (new in API 1.12)

NCID 1.13 includes an enhanced Universal Client with an option to show incoming/outgoing call duration. There is no field pair for duration.

*This section provides guidelines on how you could implement call duration by using the SCALL and ECALL field pairs, or talk duration using the PCALL and ECALL field pairs in your own clients and gateways. The PCALL field pair is new in **API 1.13**. These field pairs are present in the END: line type. This section also describes how the enhanced Universal Client shows call duration at call completion.*

The SCALL and ECALL field pairs have been part of NCID since release 0.86.1. The client DURATION column was introduced in NCID 1.13. The PCALL field pair was introduced in NCID 1.14. The DURATION column was changed to DURATION-C for call durations and DURATION-T for talk durations in NCID 1.14.

Call duration can only be calculated for input devices and gateways that are able to detect when a call begins and ends. Talk duration can only be calculated for devices that detect pickup and the end of a call.

Some input devices and gateways already calculate their own call duration. Some, of those, only have a minimum resolution in minutes. When properly implemented, NCID can track call duration with a minimum resolution in seconds.

Simply put, call duration is calculated by first converting each human readable SCALL/ECALL or PCALL/ECALL field pairs into seconds, then subtracting the converted SCALL or PCALL seconds from the converted ECALL seconds. The result is then converted back into hours, minutes, and seconds for the client to display in the DURATION-C or DURATION-T column.

Call duration caculation with the start and end hour the same, and ignored:

```
OUT: *DATE*03032022*TIME*0935*LINE*WC09*NMBR*4185558765*MESG*NONE*FNMBR*418-555-
8765*NTYPE*FIX/CELL*CTRY*US*LOCA*California*CARI*NEW CINGULAR WIRELESS PCS LLC*NAME*WIRELESS CALLER*
```

```
END: *HTYPE*BYE*DATE*03032022*TIME*0935*SCALL*03/03/2022 09:34:59*ECALL*03/03/2022
09:37:38*CTYPE*OUT*LINE*WC09*NMBR*4185558765*FNMBR*418-555-
8765*NTYPE*FIX/CELL*CTRY*US*LOCA*California*CARI*NEW CINGULAR WIRELESS PCS LLC*NAME*WIRELESS CALLER*
```

```
Call duration = End - start = 09:37:32 - 09:34:59 = 37*60+34 - 34*60+59 = 2254-2099 = 155 seconds = 02
min 35 sec = 02:35
```

*Client display in **DURATION-C** column: 00:02:35*

Call duration caculation with the start and end hour different

*OUT: DATE03032022TIME0939LINEWC09NMBR4185558765MESGNONEFNMBR418-555-8765NTYPEFIX/CELLCTRYUSLOCACaliforniaCARINEW CINGULAR WIRELESS PCS LLCNAMEWIRELESS CALLER**

*END: HTYPEBYEDATE03032022TIME0939SCALL03/03/2022 09:39:18ECALL03/03/2022 10:04:36CTYPEOUTLINEWC09NMBR4185558765FNMBR418-555-8765NTYPEFIX/CELLCTRYUSLOCACaliforniaCARINEW CINGULAR WIRELESS PCS LLCNAMEWIRELESS CALLER**

`Duration = End - start = 10:04:36 - 09:39:18 = 10*60*60+4*60+36 - 09*60*60+39*60*18 = 36276-34758 = 25 min 18 sec = 25:18`

*Client display in **DURATION-C** column: 00:25:18*

ENSURING CONNECTIVITY WITH THE SERVER

There are three different methods that clients and gateways can use to test their connection to the server.

- ***\n (newline)***

Supported in Feature Set 1. This is the most basic method. A client or gateway simply sends a \n (newline) to the server and checks for errors. The server will make a note in its log that it received a blank line, but otherwise ignores it. The server does not send any response.

- ***REQ: YO***

Supported in Feature Set 4. A client or gateway can send REQ: YO and expect an ACK: REQ YO response from the server.

- ***REQ: ACK***

Supported in Feature Set 4. A client or gateway can send REQ: ACK <commands and arguments> and expect an ACK: REQ ACK <commands and arguments> response from the server. ACK: REQ ACK sets an "ack" flag for the client that tells the server to acknowledge gateway CALL:, CALLINFO: and NOT: lines. In other words, the server is expected to echo back all commands and arguments it receives.

COMPANION DOCUMENTS

You may wish to have the following documents handy as you work with the API:

User Manual:

- *"Using NCID" chapter -> "Using Aliases" section*
- *"Using NCID" chapter -> "Using Hangup" section*

Call/Message Line Types, Categories and Structure (new in API 1.7)

OVERVIEW

New NCID releases are often accompanied by new line types for call- and/or message-type data. The actual structure of the data is usually identical with already defined line types and they differ only by the XXX: code at the beginning of each line.

In order to remove a significant amount of redundant info in this API, we've introduced the concept of category types. As new line types are added that have the same structure, they'll be assigned to a category.

The categories have a secondary benefit in that they will make it easier to insure backward compatibility with output modules. Prior to API 1.7 it was necessary for end users to carefully examine their customized output module configuration files when upgrading to a new NCID release. If a new line type was added, it usually meant that the configuration file would need to be manually edited in order to make use of the new line type. Now, whenever possible and practical, line type categories can be used in the configuration files and new NCID releases will automatically include the new line types, all without requiring customized configuration files to be manually edited.

Configuration files can still explicitly use line types if desired or if the use of categories is not practical.

Over time, we'll be updating all documentation to use the categories. This will result in less maintenance work for us.

TABLE

*The **FS** and **API** columns, respectively, indicate the minimum Feature Set and API version required.*

Click on a link to be taken to its definition.

#	Type	Category	Description	FS	API
1	BLK:	CALLTYPE	Blacklisted Call Blocked	2	1.0
2	CID:	CALLTYPE	Incoming Call	1	1.0
3	HUP:	CALLTYPE	Blacklisted Call Hangup	1	1.0
4	MWI:	CALLTYPE	Voicemail Message Waiting	2	1.7
5	OUT:	CALLTYPE	Outgoing Call	2	1.0
6	PID:	CALLTYPE	Incoming Smartphone Call	2	1.0
7	PUT:	CALLTYPE	Outgoing Smartphone Call	2	1.7
8	RID:	CALLTYPE	Ringback Call	2	1.7
9	WID:	CALLTYPE	Call Waiting Caller ID	2	1.1
10	MSG:	MSGTYPE	Message (client output) or (server alert) or (gateway alert) or (server output) or (gateway output)	1	1.0
11	NOT:	MSGTYPE	Notice of a Smartphone Message (server output) or (gateway output)	2	1.0

{CALLTYPE} CATEGORY STRUCTURE

*The text line is comprised of field pairs, the first contains the field label and the second contains the field data. Fields are separated by a * and the first field starts after a single *. The category does not appear in the data.*

```
XXX: ***DATE*<date>*TIME*<time>*LINE*<lineid>*NMBR*<number>*MESG*<hexchars>*FNMBR*<formatted
number>*NTYPE*<Number Type>*CTRY*<country>*LOCA*<location>*CARI*<carrier>*NAME*<name>*
```

The line is comprised of the following field pairs:

<label><data>**	*Description*
*DATE*date**	*where date is mmddyyyy or ddmmyyyy, m = month, d = day, y = year*
*TIME*time**	*where time is hhmm in 24-hour format, h = hour, m = minute*
*LINE*lineid**	*where lineid is the phone line identifier, NO-LINE or -*
*NMBR*number**	*where number is the caller's phone number, NO-NUMBER or -*
*MESG*chars**	*where chars is a string of hexadecimal characters, text or NONE*
*FNMBR*formatted number**	*where formatted number is the caller's formatted phone number or - (new in API 1.11)*
*NTYPE*Number Type**	*where number type is the phone number's device type or - (new in API 1.11)*
*CTRY*country**	*where country is a phone number's two-letter uppercase country code or ZZ for unknown country (new in API 1.11)*
*LOCA*location**	*where location is the phone number's area within the country or - (new in API 1.11)*
*CARI*carrier**	*where carrier is the phone number's carrier name or - (new in API 1.11)*
*NAME*name**	*where name is the caller's name, a name from the smartphone address book (use "UNKNOWN" if not in the address book), NO NAME or -*

{ENDTYPE} CATEGORY STRUCTURE

*The text line is comprised of field pairs, the first contains the field label and the second contains the field data. Fields are separated by a * and the first field starts after a single *. The category does not appear in the data.*

```
END: *HTYPE*<ec>*DATE*<date>*TIME*<time>*SCALL*<dt>*ECALL*<dt>*CTYPE*<io>*LINE*<lineid>*NMBR*
<number>*FNMBR*<formatted number>*NTYPE*<Number Type>*CTRY*<country>*LOCA*<location>*CARI*
<carrier>*NAME*<name>*
```

The END: line has the following field pairs (field label and field data):

<label><data>**	*Description*
*HTYPE*ec**	*where ec = BYE or CANCEL*
*DATE*date**	*where date is mmddyyyy or ddmmyyyy, m = month, d = day, y = year*
*TIME*time**	*where time is hhmm in 24-hour format, h = hour, m = minute*
*SCALL*date time**	*where start of call date is mm/dd/yyyy, a space and time is hh:mm:ss in 24-hour format, m = month, d = day, y = year, h = hour, m = minute, s=second*
*ECALL*date time**	*where end of call date is mm/dd/yyyy, a space and time is hh:mm:ss in 24-hour format, m = month, d = day, y = year, h = hour, m = minute, s=second*
*CTYPE*io**	*where io is either IN or OUT (this is not a pass through of the CALL: CALLtype)*
*LINE*lineid**	*where lineid is the phone line identifier, NO-LINE or -*
*NMBR*number**	*where number is the caller's phone number, NO-NUMBER or -*
*FNMBR*formatted number**	*where formatted number is the caller's formatted phone number or - (new in API 1.11)*
*NTYPE*Number Type**	*where number type is the phone number's device type or - (new in API 1.11)*
*CTRY*country**	*where country is a phone number's two-letter uppercase country code or ZZ for unknown country (new in API 1.11)*
*LOCA*location**	*where location is the phone number's area within the country or - (new in API 1.11)*
*CARI*carrier**	*where carrier is the phone number's carrier name or - (new in API 1.11)*
*NAME*name**	*where name is the caller's name, NO NAME or -*

{MSGTYPE} CATEGORY STRUCTURE

{MSGTYPE} allow for free-form text following the line type.

*Alerts have no field pairs. The Server and Client/Gateway lines do have field pairs and the difference is that the first field after the free-form text begins with *** (sent from server) or ### (sent to server) respectively.*

Server/Gateway Alerts

```
MSG: <message>
```

Alerts have a MSG: line type followed by free-form text; they have no field pairs.

Server Output Lines

```
XXX: <message> ***DATE*<mmddyyyy>*TIME*<hhmm>*LINE*<id>*NMBR\*<nmbr>\*MTYPE*IN|OUT|SYS|USER*FNMBR*
     <formatted number*NTYPE*FIX/CELL*CTRY*<cc>*LOCA*<location>*CARI*<carrier>*NAME*<name>*
```

The line is comprised of the following field pairs:

<label><data>**	*Description*
***	*start of the information part of the message being sent from the server*
*DATE*date**	*where date is mmddyyyy or ddmmyyyy, m = month, d = day, y = year*
*TIME*time**	*where time is hhmm in 24-hour format, h = hour, m = minute*
*LINE*lineid**	*where lineid is the phone line identifier, NO-LINE or -*
*NMBR*number**	*where number is the caller's phone number, NO-NUMBER or -*
*MTYPE*io**	*where io is either IN, OUT, SYS or USER*
*FNMBR*formatted number**	*where formatted number is the caller's formatted phone number or -*
*NTYPE*Number Type**	*where number type is the phone number's device type or -* *(new in API 1.11)*
*CTRY*country**	*where country is a phone number's two-letter uppercase country code or ZZ for unknown country* *(new in API 1.11)*
*LOCA*location**	*where location is the phone number's area within the country or -* *(new in API 1.11)*
*CARI*carrier**	*where carrier is the phone number's carrier name or -* *(new in API 1.11)*
*NAME*name**	*where name is the caller's name, NO NAME or -*

Client/Gateway Output Lines

`XXX: <message>###DATE*<date>*TIME*<time>*NAME*<name>*NMBR*<number>*LINE*<lineid>*MTYPE*<io>*`

The line is comprised of the following field pairs:

<label><data>**	*Description*
###	*start of the information part of the message being sent to the server*
*DATE*date**	*where date is mmddyyyy or ddmmyyyy, m = month, d = day, y = year*
*TIME*time**	*where time is hhmm in 24-hour format, h = hour, m = minute*
*LINE*lineid**	*where lineid is the phone line identifier, NO-LINE or -*
*NMBR*number**	*where number is the caller's phone number, NO-NUMBER or -*
*MTYPE*io**	*where io is either IN, OUT, SYS, USER, NONE or -*
*NAME*name**	*where name is the caller's name, NO NAME or -*

Feature Set 1: Modem and Device Support

SERVER IMPLEMENTATION

If you want to implement a server to communicate with NCID clients and gateways:

- *listen to port 3333 for a connection or whatever port is specified by **ncidd.conf::port**/landline*
- *send a 200 text message to identify the server and version*
- *send a 210 text message to identify the API version and supported feature sets*
- *(New in API 1.5) immediately after sending a 210 line, receive and process zero or more HELLO: lines*
- *check server **ncidd.conf::send cidlog** to determine whether to send the call log*
- *if not configured to send it, or the size exceeds **ncidd.conf::cidlogmax**, send a 251 Call log not sent message*
- *if configured to send it but it is empty, send a 252 Call log empty message*
- *if configured to send it but the file does not exist, send a 253 No Call log message*
- *if configured to send it and it is not empty, send a 254 Start of call log message*
- *if configured to send it and it is not empty, send the call log and end with a 250 End of call log message*
- *optionally, send a list of server-supported Client Job options to client, one OPT: <option> line for each option*
- *if a server setting is being temporarily overridden by a HELLO: CMD: <command> line, clear the override so it will not apply to future connections*
- *send a 300 End of server startup message*
- *putting all of the above together, a typical client connection start-up looks like this:*

```
                    200 Server: ncidd (NCID) x.x
                210 API: x.x Feature Set x x x x ...
          Client Sent: HELLO: IDENT: client ncid (NCID) x.x
                Client Ident: client ncid (NCID) x.x
        CIDLOG: \*DATE\*12012015\*TIME\*0028\*LINE\*POTS\*NMBR\*...
        HUPLOG: \*DATE\*12012015\*TIME\*0105\*LINE\*POTS\*NMBR\*...
                                ...
                          254 Start of call log
                           250 End of call log
```

```
OPT: hangup-1
OPT: ...
300 End of connection startup
```

- *when a call is received:*
- *if configured by **ncidd.conf::send cidinfo** to send ring info, send a CIDINFO: line at each ring with a LINE indicator (default '-') and the ring count*
- *generate an alias for the name, number and/or line if it is in the alias file*
- *(New in API 1.11) format the telephone number oountry specific*
- *if optional Internal Hangup support (**ncidd.conf::hangup**) is implemented:*
- *hangup a call if it is in the **ncidd.alias** file but not in the **ncidd.whitelist** file*
- *hangup a call using a modem:*
- *modem off-hook*
- *send HUP: line to connected clients*
- *delay*
- *modem on-hook*
- *if optional Hangup Extensions support (**ncidd.conf::hupmode**) is implemented:*
- *hangup a call if the Hangup Extension script determines it should be terminated*
- *hangup a call using a modem:*
- *modem off-hook*
- *send HUP: line to connected clients*
- *delay*
- *modem on-hook*
- *otherwise, if the call is not being terminated, send a CID: line to connected clients when a call is received*
- *send a CIDINFO: line after ringing stops, with a ring count of 0*
- *send a CIDINFO: when automatic hangup is completed, with a ring count of -4.*
- *send a MSG: line to connected clients with an important server warning or a user message*
- *maintain a constant TCP connection with the clients*
- *allow clients to send a \n (newline) to determine if the server is still available but ignore it (no response is sent back to the client)*
- *detect clients as they come and go*
- *(New in API 1.6) allow clients to send an optional GOODBYE (note that there is no trailing colon) line to close the connection to the server*

Server Output Lines

When the server sends information to a client or gateway, it sends the data as lines of text that start with a line label. This defines line types. The current line labels are:

- *200*

The server version message. The wording stays the same, but the version number changes each time the server is updated.

For example, if the server was version 1.0:

```
200 Server: ncidd (NCID) 1.0
```

- *210*

The server API version and feature sets. This is to inform clients and gateways what features are implemented. All supported feature sets must be included.

For example, if the API version is 1.0 then four feature sets are supported:

```
210 API: 1.0 Feature Set 1 2 3 4
```

- *250 - 254*

A call log message sent at server startup (in API 1.13 these can end in a timestamp showing tha last change of the call log):

```
250 End of call log 1670894717
```

```
251 Call log not sent 1670894717
```

```
252 Call log empty 1670894717
```

```
253 No Call log
```

```
254 Start of call log 1670894717
```

- *300*

End of the connection startup message:

```
300 End of connection startup
```

- *CID:*

An incoming Caller ID text line. It is sent to the clients and saved in the call log when a call is received.

It has the {CALLTYPE} Category Structure.

- *CIDINFO:*

*A text line that indicates the telephone LINE identifier and ring information. The text line is comprised of field pairs, the first contains the field label and the second contains the field data. Fields are separated by a * and the first field starts after a *. The ring information is only obtained from modems that indicate each ring or gateways that use ring to indicate the type of call termination. Note that "termination" for CIDINFO: lines does not refer to automatic Internal Hangups or Hangup Extensions. Instead, it refers to a person on the phone who triggers the hangup manually, or the telco that ends a call that has not been answered after a certain number of rings.*

```
CIDINFO: *LINE*<lineid>*RING*<count>*TIME*<time>*
```

The CIDINFO: line has the following fields:

<label>*<data>*	***Description***
*LINE*lineid**	*where lineid is the phone line identifier, NO-LINE or -*
*RING*count**	*where count is 0, -1, -2, -3, -4 or a positive value incremented at each ring* *0 = (modem) ringing has stopped* *-1 = (gateway) call terminated without pickup* *-2 = (gateway) call terminated after pickup* *-3 = (gateway) BUSY signal for incomplete call* *-4 = (modem) automatic hangup completed*
*TIME*time**	*where time is hh:mm:ss in 24-hour format,* *h = hour, m = minute, s=second*

Ring indication example sent to the clients for ring count 4 and line 1:

```
CIDINFO: *LINE*1*RING*4*TIME*16:20:05*
```

Example of a POTS line label and the end of ringing indicator:

```
CIDINFO: *LINE*POTS*RING*0*TIME*16:20:05*
```

A SIP gateway example indicating termination without pickup and a VOIP line label:

```
CIDINFO: *LINE*VOIP*RING*-1*TIME*16:20:05*
```

A SIP gateway example indicating termination after pickup and a VOIP line label:

```
CIDINFO: *LINE*VOIP*RING*-2*TIME*16:20:05*
```

- HUP:

If Internal Hangup support (**ncidd.conf::hangup**) or Hangup Extensions support (**ncidd.conf::hupmode**) is implemented, then when a call is automatically terminated, a HUP: (Hung Up Phone) line is created by replacing the CID: label with the HUP: label.

It has the {CALLTYPE} Category Structure.

- LOG:

When the server sends the call log, it adds the LOG: tag to every line that does not contain a recognized line label. The following is an example of a comment line that may be in the file:

```
LOG: # Aug 1 00:30:01 localhost newsyslog[35020]: logfile turned over
```

- MSG: (server alerts)

A text line containing a server alert that is sent to the clients and saved in the call log. It has free-form text only and no field pairs.

It has the {MSGTYPE} Category Structure for Server/Gateway Alerts.

Example:

```
MSG: Caller ID Logfile too big: (95000 > 90000) bytes
```

- MSG: (server output)

A text line containing a server message that is sent to the clients and saved in the call log.

It has the {MSGTYPE} Category Structure for Server Output Lines.

- OPT: <hangup-X|hupmode-X|ignore1|regex-X>
- OPT: LineIDs: <lineid> [<lineid>] .... (new in API 1.6)
- OPT: country: <country code> (new in API 1.11)

A server option sent to all the clients. Multiple OPT: lines are permitted and the lines do not need to be sent in any particular order. Unless otherwise indicated, options are always in lowercase.

- OPT: hangup-X

Informational only, corresponds to the value of **ncidd.conf::hangup** where "X" is in the range 1-3. This line is not sent if **ncidd.conf::hangup** has the value zero.

- OPT: hupmode-X

Informational only, corresponds to the value of **ncidd.conf::hupmode** where "X" is in the range 1-3. This line is not sent if **ncidd.conf::hupmode** has the value zero.

- OPT: ignore1

Informational only, corresponds to the value of **ncidd.conf::ignore1**. This line is not sent if **ncidd.conf::ignore1** has the value zero.

- OPT: regex-X

Informational only, corresponds to the value of **ncidd.conf::regex** where "X" is in the range 0-2.

- OPT: LineIDs: <lineid> <lineid> ....

When **ncidd.conf::cidinput** indicates that an "AT" modem is connected, OPT: LineIDs: becomes a list of each **ncidd.conf::lineid**, up to a maximum of four, after applying LINE alias(es). This is a space-delimited list and if any **ncidd.conf::lineid** contains embedded spaces, enclose it in quotes.

Example:

```
OPT: LineIDs: "POTS" "WORK 1" "VOIP" "WORK 2"
```

*OPT: LineIDs: is not sent if **ncidd.conf::cidinput** indicates no "AT" modem is attached.*

When there is more than one lineid, clients must allow the user to select from this list when implementing Feature Set 3 REQ: DIAL.

Multiple modems are supported, OPT: LineIDs: will contain one or more lineids, each one in quotes.

- *OPT: country: <country code>*

*Required, indicates the two-letter uppercase country code. The default country code is US unless **ncidd.conf::country** is set.*

(New in API 1.3) Unless otherwise noted, all OPT: lines output by the server are for informational and troubleshooting purposes only. Clients can optionally make use of them by giving the user a way to display them. Otherwise, clients are not required to display them, do not need to take any action on them and can safely ignore them. See Feature Set 1: Client Implementation for more information.

Server Alias Support

The name, number and telephone line of a call are checked for an alias. If a match is found it will be replaced by its alias before the call is added to the call log and before the call information is sent to the clients.

NCID's support for aliases is extensive and there is an entire section in the User Manual devoted to the subject (see the chapter "Using NCID"). Continue reading below for:

- *only API-specific topics*
- *a summary of all alias types*
- *a summary of alias-related configuration options in **ncidd.conf***

Alias support is required in Feature Set 1.

Clients implementing Feature Set 3: Client Job Support, can also be used to maintain aliases. Such clients will also provide a way to force the server to reload its alias table.

Alias Types

There are six types of aliases. The text in the Code column below is used internally by NCID to distinguish the types and you'll see it used throughout this document.

Type	*Code*
number	*NMBRONLY*
name	*NAMEONLY*
number & name	*NMBRNAME*
number if name	*NMBRDEP*
name if number	*NAMEDEP*
lineid	*LINEONLY*

Alphabetical list of related configuration options:

- *ncidd.conf::cidalias*
- *ncidd.conf::ignore1*
- *ncidd.conf::lineid*
- *ncidd.conf::regex*

Server Hangup Support

At a high-level, there are two sets of procedures available to automatically hangup calls. Both are optional and one or both can be enabled at the same time. They are:

- *Internal Hangups. This is built in to the NCID server and uses the **ncidd.blacklist::** and **ncidd.whitelist::** files.*
- *Hangup Extensions. This lets you use an external script or program.*

Internal Hangups are described below. Hangup Extensions are optional.

When Caller ID is received from a modem and if the caller name or number is in the blacklist file but not the whitelist file, hangup is automatic.

NCID's support for automatic hangups is extensive and there is an entire section in the User Manual devoted to the subject (see the chapter "Using NCID"). Continue reading below for:

- *only API-specific topics*
- *details of the AT commands sent for all hangup types*
- *a summary of Internal Hangup-related configuration options in **ncidd.conf***

Internal Hangup support is optional in Feature Set 1.

Clients implementing Feature Set 3: Client Job Support, can also be used to maintain the blacklist and whitelist. Such clients will also provide a way to force the server to reload these tables.

When the server hangs up the line, it sends a HUP: line to the clients and call log. The HUP: line has the same layout as the CID: line generated from the call, but with CID: replaced by HUP:.

Internal Hangup Types

*If enabled by **ncidd.conf::hangup**, there are three types of hangups:*

- ***Normal (required)***

When the server receives the Caller ID and if the name or number is in the blacklist file but not the whitelist file, the modem does a pickup, delays for one second and then does a hangup.

Action	*Send this AT command*
PICKUP the line	*ATH1*
delay 1 second	
HANGUP	*ATH0*

- ***FAX (optional)***

When the server receives the Caller ID and if the name or number is in the blacklist file but not the whitelist file, the modem sets FAX mode, does a FAX answer, generates a FAX tone, delays for 10 seconds, hangs up and resets to data mode.

Action	*Send this AT command*	*Expected modem response*
Set FAX Mode	*AT+FCLASS=1*	*OK*

- PICKUP the line| ATH1 | OK FAX Answer | ATA | delay 10 seconds | | HANGUP | ATH0 | OK Set DATA Mode | AT+FCLASS=0 |

** NOTE: **PICKUP** is a configuration option. Older modems may fail to generate a FAX tone if there is a PICKUP.*

- ***Announce (optional)***

When the server receives the Caller ID and if the name or number is in the blacklist file but not the whitelist file, the modem sets VOICE mode, answers the call, plays a recording, hangs up and resets to data mode.

Action	*Send this AT command*	*Expected modem response*
Set VOICE Mode	*AT+FCLASS=8*	*OK*
Set speaker volume to normal	*AT+VGT=128*	*OK*

- Select compression method | AT+VSM=130 | OK Answer call | AT+VLS=1 | OK Set echo off | ATE0 | OK Select VOICE TRANSFER Mode | AT+VTX | CONNECT Send recording to modem | | Send end of recording | <DLE><ETX> | OK Set echo on | ATE1 | OK HANGUP | ATH0 | OK Set DATA Mode | AT+FCLASS=0 |

** NOTE: AT+VSM=130 is the default compression method used for the Conexant CX93001 chipset used in a lot of modems.*

Alphabetical list of related server configuration options:

- *ncidd.conf::announce*
- *ncidd.conf::audiofmt*
- *ncidd.conf::blacklist*
- *ncidd.conf::cidinput*
- *ncidd.conf::hangup*
- *ncidd.conf::ignore1*
- *ncidd.conf::initcid*
- *ncidd.conf::initstr*
- *ncidd.conf::lockfile*
- *ncidd.conf::pickup*
- *ncidd.conf::regex*
- *ncidd.conf::ttyclocal*
- *ncidd.conf::ttyport*
- *ncidd.conf::ttyspeed*
- *ncidd.conf::whitelist*

Modem-to-Server

In the US, telcos transmit the Caller ID between the first and second rings. Telcos in other countries may transmit it before the first ring. Nothing needs to be configured in NCID to accommodate this difference, however, it is important that modems be configured for the correct country code. The default is normally set based on where it is purchased. If not, the user will need to do a one-time, manual configuration of the country code, usually using the AT+GCI command.

ASCII Plain Format Caller ID

This is a human-readable version of detected Caller ID. It is controlled by setting ***ncidd.conf::initcid****. Typical values are "AT+VCID=1" or "AT#CID=1". Formatted Caller ID is the NCID default.*

An example of a modem's Caller ID output is shown below. The order of the lines is unimportant and some of the lines may not be present. For example, the MESG line is normally not emitted by modems.

There may or may not be a space before the '='.

The NMBR label may be DDN_NMBR (Dialable Directory Number) instead, depending on the country.

```
RING
```

```
MESG = 110101
DATE = 0511
TIME = 1852
NMBR = 4075550000 or DDN_NMBR = 4075550000
NAME = JOHN DOE
```

```
RING
```

ASCII Hex Format Caller ID (SDMF, MDMF a.k.a. XDMF) (new in API 1.7)

*This is an "ASCII Hex" version of detected Caller ID. It is controlled by setting **ncidd.conf::initcid**. Typical values are "AT+VCID=2" or "AT#CID=2". This is the actual data stream supplied by telcos. Not all modems support enabling unformatted output.*

The XDMF format for Caller ID from modems is a long line in hexadecimal characters as ASCII text. XDMF is either MDMF or SDMF.

It is important to note that only modems configured for XDMF Caller ID send the output as ASCII text.

*As long as the modem has been initialized with the appropriate **ncidd.conf::initcid** string, the NCID server automatically detects Formatted and Unformatted Caller ID data streams.*

SDMF (Single Data Message Format) allows telcos to supply the date, time and Caller ID phone number only. If the phone number is unavailable, a single letter in place of the phone number will indicate the reason: A = anonymous, O = out of area, P = private.

Here is the SDMF equivalent of the above Formatted Caller ID:

```
RING
```

```
0412303531313138353234303735353530303059
```

```
RING
```

The hexadecimal string is parsed as follows:

```
0412 3035313131383532 34303735353530303030 59
```

```
Type Len             ASCII Hex                 DATA
                   04h 12h SDMF Call
     DateTime    3035 3131 3138 3532        '05111852'
    Number      3430 3735 3535 3030 3030   '4075550000'
                  59h     Checksum
```

The data consists of:

- *a one-byte (two hexadecimal characters) parameter type ('04' means SDMF in this example)*
- *a one-byte (two hexadecimal characters) parameter length ('12' in hex, 18 in decimal) excluding the checksum byte*
- *zero or more bytes of parameter data (date, time, phone number).*
- *a one-byte (two hexadecimal characters) checksum value calculated as the two's complement of the modulo 256 sum of all preceding bytes.*

MDMF (Multiple Data Message Format) is an enhanced version of SDMF that adds the Caller ID name and can also include the data for other telco services (e.g. voicemail message waiting). Most telcos now use MDMF.

Whereas SDMF consists of a single parameter "block" followed by a checksum, MDMF consists of multiple parameter blocks followed by a checksum.

Here is the MDMF equivalent of the above Formatted Caller ID:

```
RING
```

```
80200108303531313138353202 0A34303735353530303030 07084A4F484E20444F4584
```

```
RING
```

The hexadecimal string is parsed as follows:

```
8020 0108303531313138353 2 020A34303735353530303030
                07084A4F484E20444F45 84
```

```
Type Len             ASCII Hex                 DATA
                   80h 20h MDMF Call
 01h 08h DateTime    3035 3131 3138 3532        '05111852'
02h 0Ah Number      3430 3735 3535 3030 3030   '4075550000'
 07h 08h Name        4A4F 484E 2044 4F45        'JOHN DOE'
                     84h     Checksum
```

Here, '80' indicates MDMF, '20' is 32 in decimal for the number of bytes to follow excluding the checksum byte.

For a good overview of SDMF and MDMF, see: https://melabs.com/resources/callerid.htm
Note that not all of the checksums shown on the above page are correct and the site's owner has been notified.

Optional Server Extensions

A Server Extension is an optional external script or program that is called by ncidd to perform a function and return a result. Server Extensions are a way for users to add functionality to NCID without requiring changes to NCID itself, especially when the functionality is atypical and would not have a broad appeal to other NCID users.

Server Extensions are isolated from the main NCID distribution and because of this they do not normally require any changes when NCID is upgraded to a later version.

One of the design philosophies that has always existed with NCID is to accept incoming Caller ID as quickly as possible and to send it to all connected clients as quickly as possible. With a Server Extension, there is a risk that executing one can impact performance. For this reason, users are cautioned to create Server Extensions that are optimized for fast execution.

The overall theory of operation is that ncidd will pass call info to the Server Extension, it will do whatever processing is desired and return back to ncidd some sort of result.

*In order for ncidd to use Server Extensions, there is a minimal amount of configuration information required in **ncidd.conf**. Typically this consists of a setting to enable/disable the Server Extension and a setting to tell ncidd the Server Extension name. Server Extensions may have specific options that also need to be in **ncidd.conf**.*

Beyond the minimal info needed to make ncidd aware of the Server Extension, there is no reason that a Server Extension could not have its own configuration file.

You can use any scripting or programming language desired, however, if it is a scripting language and not a compiled binary, the first line must use the normal Unix convention of a "#!" path to the interpreter.

Examples:

```
#!/bin/bash
#!/usr/bin/perl
```

Currently the only Server Extension supported is the Optional Server Hangup Extension.

Optional Server Hangup Extension

*You might want to implement a Hangup Extension if you want additional or alternative call termination checking beyond the basic Internal Hangup that's implemented with the **ncidd.blacklist** and **ncidd.whitelist** files. All **ncidd.conf::hangup** modes (normal, fax, announce) are supported.*

*One advantage that Hangup Extensions have over the basic Internal Hangup is the ability to associate a different **ncidd.conf::announce** file for every Caller ID number or name.*

*The Hangup Extensions script determines what calls to hang up on. It does not use **ncidd.blacklist** but does use **ncidd.whitelist**. If the call is in **ncidd.whitelist** or if the basic Internal Hangup is enabled and has hung up on the call, the hangup script is not executed.*

Alphabetical list of related server configuration options:

- *ncidd.conf::hupmode*
- *ncidd.conf::hupname*
- *ncidd.conf::huprmd*

*The **ncidd.conf::hupname** file must begin with* `hangup-` .

ncidd passes one string of call info as a single command line argument. It passes it at the point just prior to changing the line type from CID: to HUP:. ncidd must wait for the Hangup Extension response data before continuing.

The string of call info has the following format and is subject to the rules described in About line types and field pairs.

```
*DATE*<date>*TIME*<time>*LINE*<lineid>*NMBR*<number>*NAME*<name>*MODE*<hupmode>*
```

It has the following fields:

<label><data>**	*Description*
*DATE*date**	*where date is mmddyyyy or ddmmyyyy, m = month, d = day, y = year*
*TIME*time**	*where time is hhmm in 24-hour format, h = hour, m = minute*

*LINE*lineid**	*where lineid is the phone line identifier, NO-LINE or -*
*NMBR*number**	*where number is the caller's phone number, NO-NUMBER or -*
*NAME*name**	*where name is the caller's name, NO NAME or -*
*MODE*hupmode**	*where hupmode is in the range of 1 to 3*

Data to be passed back from the Hangup Extension to ncidd must be sent to STDOUT.

Format 1:

One of these optional lines, depending on the value of hupmode:

```
Using HUPMODE 1 - Normal Hangup
Using HUPMODE 2 - FAX Hangup
Using HUPMODE 3 - VOICE Hangup
```

```
HangupReason:<your optional custom hangup reason>
hangup|OK
```

*Format 2, when **ncidd.conf::hupmode** = 3 you can specify an optional voice file:*

One of these optional lines, depending on the value of hupmode:

```
Using HUPMODE 1 - Normal Hangup
Using HUPMODE 2 - FAX Hangup
Using HUPMODE 3 - VOICE Hangup
```

```
Recording:<file name or full path>
HangupReason:<your optional custom hangup reason>
hangup|OK
```

*Format 3, when **ncidd.conf::hupmode** != 3 and hupmode 3 is required:*

One of these optional lines, depending on the value of hupmode:

```
Using HUPMODE 1 - Normal Hangup
Using HUPMODE 2 - FAX Hangup
Using HUPMODE 3 - VOICE Hangup
```

```
Voice hangup is required
abort
```

(New in API 1.6) You can specify an optional reason that the Hangup Extension is terminating the call by sending the `HangupReason:` line. When the ncidd server detects this line, it will append <your optional custom hangup reason> to the NAME appearing in the HUP: line. The `HangupReason:` line must be sent prior to the `hangup` line.

*The `Recording:` line must be sent prior to the `hangup` line. If it is not present, it will default to the voice file in **ncidd.conf::huprmd**. If **ncidd.conf::huprmd** is not defined, the **ncidd.conf::announce** voice file will be used.*

All data sent to STDOUT by the Hangup Extension will be saved to ncidd.log.

*If and only if `hangup` is passed back to ncidd will the call be immediately terminated. Passing back `OK` is not required (no response at all is also acceptable) but it is suggested because you'll be able to see it in **ncidd.log**.*

Optional NetCallerID Device-to-Server

The NetCallerID serial device outputs the Caller ID on a single line with the following format:

`###DATE<datetime>...NMBR<number>...NAME<words>+++\r`

The NetCallerID line has the following fields:

<label><data>	*Description*

###	*start of the information part of the message being sent to the server*
DATEdatetime	*where datetime is mmddhhmm or ddmmhhmm, m = month, d = day, h = hour, m = minute*
...	*field separator*
NMBRnumber	*where number is the phone number*
...	*field separator*
NAMEwords	*where words is a name or -UNKNOWN CALLER- or -MSG OFF- or similar*
+++	*end of the information part of the message*

Examples:

```
###DATE03301423...NMBR4075551212...NAMEWIRELESS CALL+++\r
###DATE03301423...NMBR...NAME-UNKNOWN CALLER-+++\r
###DATE03301423...NMBR...NAME+++\r
###DATE...NMBR...NAME-MSG OFF-+++\r
```

Optional TCI Device-to-Server (new in API 1.1)

*Serial **TCI** devices output a single line using the **Telephone Collectors International** output standard.*

To make sure the text line is from a TCI device, the server tests to make sure all of the following are true:

line length > 30 characters
position 0 is a digit
position 9 is a '/'
position 24 is an 'M'

The TCI line has the following fields:

Positions	Length	Description
0-1	2	LINE
7-11	5	DATE
17-24	8	TIME
29-43	15	NUMBER
55-69	15	NAME

Example:

```
01      9/03      2:25 PM       806-672-1767           WIRELESS CALLER
012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
                  1         2         3         4         5         6
```

NOTE:

All fields except NAME are right justified. Five spaces separate each field, except NUMBER and NAME fields which are separated by 11 spaces.

CLIENT IMPLEMENTATION

- *connect to port 3333 or whatever port is specified in server configuration*
- *receive a 200 server version text message*
- *receive a 210 server API version text message*
- *(New in API 1.5) send zero or more HELLO: lines*
- *if no call log is sent by the server, receive a 251 Call log not sent or a 252 Call log empty or a 253 No Call log message*
- *if a call log is sent by the server, it:*
  - *may contain CIDLOG: text lines to be parsed and displayed*
  - *may contain HUPLOG: text lines to be parsed and displayed*
  - *may contain LOG: text lines which must be ignored*
  - *may contain MSGLOG: text lines to be parsed and displayed*
  - *will end with a 250 End of call log message*
- *receive zero or more OPT: <option> lines.*

NEW IN API 1.3

Unless otherwise noted, all OPT: lines output by the server are for informational and troubleshooting purposes only. Clients can optionally make use of them by giving the user a way to display them. Otherwise, clients are not required to display them, do not need to take any action on them and can safely ignore them. See also Feature Set 1 OPT: definition for more information.

If a client wants to optionally display the OPT: lines then it will need to do the following:

- *Retrieve all OPT: lines during the initial connection to the server.*
- *Have a way for users to easily view the OPT: lines. They can be displayed however is convenient for the programming language the client is written in. Displaying the leading OPT: text is optional, but the text following OPT: must be shown.*
- *Handle OPT: hangup (i.e., with no dash-value) in order to accommodate servers that are not yet compliant with API 1.3.*
- *Handle OPT: regex (i.e., with no dash-value) in order to accommodate servers that are not yet compliant with API 1.7.*
- *Show "none" if no OPT: lines were received.*

It is suggested, but not required:

- *That the lines be shown in a vertical list.*
- *That user-friendly text be shown to allow easy interpretation of the setting.*
- *That the lines be shown in a Help Menu.*

Examples below show OPT: hangup for a pre-API 1.3 server and OPT: hangup-3, even though they won't both be generated by the same server. Similarly for a pre-API 1.7 server, OPT: regex and OPT: regex-2 won't both be present.

Minimum suggested examples:

```
Server-enabled options:
      OPT: hangup
    OPT: hangup-3
   OPT: hupmode-2
    OPT: ignore1
      OPT: regex
     OPT: regex-2
OPT: LineIDS: "LandLine" "VoIP"
```

or

```
Server-enabled options:
        hangup
      hangup-3
     hupmode-2
      ignore1
        regex
     regex-2
LineIDS: :LandLine" "VoIP"
```

or

```
Server-enabled options:
          none
```

Ideal suggested examples showing all options:

Server-enabled option	*Description*
none	
hangup|hangup-1	*Internal Hangup Mode 1: Terminate Blacklisted Call*
hangup-2	*Internal Hangup Mode 2: Generate FAX Tone and Terminate Blacklisted Call*
hangup-3	*Internal Hangup Mode 3: Play Announcement and Terminate Blacklisted Call*
hupmode-1	*Hangup Extension Mode 1: Terminate Blacklisted Call*
hupmode-2	*Hangup Extension Mode 2: Generate FAX Tone and Terminate Blacklisted Call*
hupmode-3	*Hangup Extension Mode 3: Play Announcement and Terminate Blacklisted Call*
ignore1	*Server Ignores Leading 1 for Calls/Aliases*
regex|regex-1	*Use POSIX Extended Regular Expressions for Server List Matching*
regex-2	*Use Perl Regular Expressions for Server List Matching*
LineIDS: "LandLine" "VoIP"	*Available lines for dialing numbers*
(anything else)	*Unknown/invalid*

- *receive a 300 End of server startup message*
- *possibly receive a CIDINFO: line at each ring or just at the end of the call*
- *possibly receive a CID: line whenever a call is received*
- *possibly receive an HUP: line whenever a call is automatically terminated*
- *clients are allowed to send a text message to the server using a MSG: line*
- *clients are allowed to connect and disconnect as they please*
- *(New in API 1.6) possibly send an optional GOODBYE (note that there is no trailing colon) line to the server to close the connection*
- *possibly send a \n (newline) to the server to determine if the server is still available.*
- *(New in API 1.4) clients must always ignore line types that begin with "+" (e.g., +CID:, +CIDINFO:) because these represent call activity from a Forwarding Gateway (Server-to-Server) that are processed only by the NCID server*

Client-to-Server

- *\n (newline)*

Clients are allowed to send a \n (newline) to the server to determine if the server is still available. It should be sent only after at least 15 minutes of no server activity. There is no server response, however, the server will log this action as "Client xxx sent empty line." It is up to the client to check to see if sending a \n (newline) results in an error and take appropriate action (e.g., try to reconnect to the server).

If a client needs a more robust way of making sure the server is still available by requiring a server response, implement Feature Set 4: Acknowledgment Support.

- *(New in API 1.6) GOODBYE (note that there is no trailing colon)*
- *This optional line type allows the client to force a graceful disconnect from the server, rather than relying on the server to disconnect due to a connection timeout or error. This is an experimental feature to allow a simple register/unregister of clients using alternative connection protocols (e.g., a RESTful interface).*
- *HELLO: IDENT: <ident>*
  HELLO: CMD: <command>

- *<ident> is any freeform text, upper and/or lowercase and any number of words separated by spaces. It is used to identify the client.*
- *Only one <ident> line is expected but this is not strictly enforced.*
- *The recommended client <ident> contents are:*

<client> <program name> <version number>

or

(New in API 1.6)

<client> <[hostname/]program name> <version number> [OUT]

- *A server has the option of logging or displaying the <ident> string as clients connect and disconnect.*

New in API 1.6

- *hostname is optional, but if present it should end with a trailing slash and be followed immediately by the program name.*
- *The presence of the special uppercase text [OUT] following the version in the <ident> string is used in Feature Set 2: Gateway Support and Feature Set 3: Client Job Support to tell the server that the client or gateway will be generating OUT: lines. For more information, go to REQ: DIAL.*
- *<command> controls a server setting or action. There can only be one <command> per line and unless otherwise indicated, commands are always in lowercase.*
- *Multiple lines are permitted. The order of IDENT: <ident> and CMD: <command> lines does not matter.*
- *HELLO: line types are sent only when a connection is first established. The server delays on connect after sending a 210 line in order give a client the opportunity to send the optional HELLO: lines. To clarify, HELLO: line types must be sent by the client immediately after receiving a 210 line.*
- *Any HELLO: line type received after the server starts sending the call log is handled as an unknown line type.*
- *An example client connection start-up looks like this:*

```
200 Server: ncidd (NCID) x.x
210 API: x.x Feature Set x x x x ...
HELLO: IDENT: client ncid x.x.x
HELLO: CMD: no_log
HELLO: ...
251 Call log not sent: /var/log/cidcall.log
OPT: hangup-1
OPT: ...
300 End of connection startup
```

- *Unlike most other line types, HELLO: line types must NOT be sent to clients.*
- *At present, there are two commands:*

```
HELLO: CMD: no_log
HELLO: CMD: send_log
```

*The purpose of the no_log command is to temporarily override the server's **ncidd.conf::send cidlog** setting. By doing so, the client or gateway can finish connecting much quicker because no call log will be sent. The override is maintained only for the currently connecting client or gateway and only for the duration of its connection startup.*

*(New in API 1.6) If **ncidd.conf::send cidlog** is enabled and HELLO: CMD: no_log is sent to the server, instead of sending the log, the server must respond with 251 Call log not sent. The connection startup continues normally, ending with 300 End of connection startup. It is critical that the server clears this temporary override so that it is not carried over to future connections.*

*(New in API 1.6) If **ncidd.conf::send cidlog** is not enabled and HELLO: CMD: send_log is sent to the server, the server must try to send the log and respond with either 250 End of call log, 252 Call log empty, or 253 No Call log. The connection startup continues normally, ending with 300 End of connection startup. It is critical that the server clears this temporary override so that it is not carried over to future connections.*

The no_log command has no effect on the Feature Set 3 REQ: REREAD Client Job that causes the call log to be resent.

(New in API 1.6) The send_log command has no effect on REQ: REREAD either.

- *MSG: (client output)*

A text line containing a user-generated message that is sent to the server, saved in the call log and then forwarded to all listening clients.

It has the {MSGTYPE} Category Structure for Client/Gateway Output Lines.

Example:

```
MSG: This is a user message ###DATE ...
```

Optional Client-to-Module

When the client is configured to use an output module, it splits the single server call line into thirteen lines for passing via standard input to the output module.

```
<DATE>\n<TIME>\n<NMBR>\n<NAME>\n<LINE>\n<TYPE>\n<MTYPE>\n<MESG>\n<FNMBR>\n<NTYPE>\n<CTRY>\n<LOCA>\n<CARI>\n
```

Click on a link to be taken to its definition.

Line	Field	Description
1	<DATE> mm/dd/yyyy or dd/mm/yyyy	date of either the call or message where m = month, d = day, y = year
2	<TIME> hh:mm or hh:mm am/pm	time of either the call or message where h = hour, m = minute
3	<NMBR>	phone number of either the call or message
4	<NAME>	caller's name
5	<LINE>	lineid of either the call or message
6	<TYPE>	one of the {CALLTYPE} or {MSGTYPE} line types from the Categories table
7	<MESG>	message, or blank for a call
8	<MTYPE>	If <TYPE> indicates a call then <MTYPE> will be null. Otherwise, <MTYPE> will be IN, OUT, SYS, USER, NONE or -.
9	<FNMBR>	formatted phone number (new in API 1.11)
10	<NTYPE>	phone number's device type (new in API 1.11)
11	<CTRY>	phone number's two-letter uppercase country code (new in API 1.11)
12	<LOCA>	phone number's location within the country (new in API 1.11)
13	<CARI>	phone number's carrier name or - (new in API 1.11)

~~*Optional Client-to-TiVo Display*~~ *(Removed in API 1.6)*

~~*If the TiVo (--tivo|-T) option is given on the command line when launching the ncid client, or the TivoFlag is set to 1 in ncid.conf, the output is two lines. The first line contains the Caller ID name and number. The second line contains the type of call and a telephone lineid. If the lineid is blank, then there is no second line:*~~

```
PASADENA,  CA (800)555-1212
```

```
PASADENA,  CA (800)555-1212
CID-POTS
```

Feature Set 2: Gateway Support

SERVER IMPLEMENTATION

If you want to implement a server to communicate with NCID clients and gateways:

- *implement a Feature Set 1 server*
- *detect gateways as they come and go*
- *if a gateway sends a line prefixed with CALL:, process it to generate a {CALLTYPE} line*
- *if a gateway sends a line prefixed with CALLINFO:, process it to generate:*
  - *an END: line and*
  - *a CIDINFO: line with CANCEL if the ring count is -1, or*
  - *a CIDINFO: line with BYE if the ring count is -2, or*
  - *a CIDINFO: line with BUSY if the ring count is -3*
- *if a gateway sends a {MSGTYPE} Client/Gateway Output Line, process it to generate a {MSGTYPE} Server Output Line (normally this is just replacing ### with ***)*
- *(New in API 1.6) examine one or more HELLO: IDENT: <ident> lines sent by clients and gateways to see if the <ident> string identifies certain client-specific or gateway-specific features that the server needs to be aware of.*

XDMF input

The XDMF gateway (xdmf2ncid) accepts either hex input from a modem or binary input from a device.

Devices such as the CTI Comet USB or the Holtek HT9032D based PSTN Caller ID module output XDMF (MDMF or SDMF) Caller ID with the same parameter structure as modems, but do so as binary data and do not emit RING lines.

Set xdmf2ncid::ht9032 = 0 for input from a Comet or modem.
Set xdmf2ncid::ht9032 = 1 for input from a Holtek HT9032D module.

The data consists of:

- *a one-byte parameter type for MDMF or SDMF*
- *a one-byte parameter length excluding the checksum byte*
- *zero or more bytes of parameter data (date, time, phone number)*
- *a one-byte checksum value calculated as the two's complement of the modulo 256 sum of all preceding bytes.*

Refer to ASCII Hex Format Caller ID (SDMF, MDMF a.k.a. XDMF) for:

- *ASCII Hex data from modems*
- *Description of SDMF and an example of the format*
- *Description of MDMF and an example of the format*

An SDMF binary string, same as the example SDMF string in ASCII Hex:

```
                    0412 05111852 4075550000 59

            Type Len            DATA        FORMATTED
                        04h 12h SDMF Call
                   DateTime   05111852    05/11  18:52
                   Number     4075550000  407-555-0000
                        59h     Checksum
```

An MDMF binary string, same as the example MDMF string in ASCII Hex:

```
                8020 05111852 020A4075550000 07084A4F484E20444F45 84

                 Type Len            DATA                FORMATTED
                                  80h 20h MDMF Call
```

```
                                  01h 08h DateTime    05111852            05/11  18:52
                                  02h 0Ah Number      4075550000          407-555-0000
                                    07h 08h Name        4A4F 484E 2044 4F45  JOHN DOE
                                                      84h     Checksum
```

Holtek HT9032D operation mode

The Holtek HT9032D based PSTN Caller ID module also outputs random data. In between this noise is the actual XDMF data, preceded by 27 or 28 x 0x55 (U chars), with a final random character.

The following depicts the output from the Holtek HT9032D module:

<RANDOM DATA><27 or 28 U's><RANDOM CHARACTER><MDMF PACKET><RANDOM DATA>

The XDMF packet format: ***<XDMF start><length><data><checksum>***

The XDMF packet length is used to strip the random data that follows the XDMF packet checksum.

For a good overview see: Testing LinkSprite Caller ID Module (based on HT9032) with a PC.

The logic for determining data and noise packets takes one or two reads.

- *Read1:*
  Must either contain 10 or more U's to indicate the start of a XDMF packet, or end in a U to indicate the start of a possible XDMF packet. If neither, read1 is random data and is ignored.
- *Read2:*
  Needed if read1 contains 10 or more U's but does not contain any XDMF packet, if read1 ends in a U or if read1 contains a partial XDMF data packet.

If the number of U's between read1 and read2 is still less than 10, both read1 and read2 are random characters and ignored. A log entry indicates this.

Server Output Lines

- *BLK:*

When a call is automatically blocked, a BLK: (Call Blocked) line is created. A blocked call is one where the CID device (e.g., Whozz Calling Ethernet Link devices) does not pass an incoming call through to connected telephones. The calling party simply hears the line ringing. Compare this with a terminated (HUP:) call where the calling party hears the line disconnect and may or may not hear the line ringing at all.

It has the {CALLTYPE} Category Structure.

- *END:*

An end-of-call text line. It is generated from the CALLINFO: text line from a gateway. It provides information that can be used for call accounting.

It has the {ENDTYPE} Category Structure.

For call accounting purposes, it is intended that a client use the DATE, TIME, LINE, NMBR and CTYPE field pairs as a unique key identifier for records in the call log.

- *MWI: (new in API 1.7)*

A voicemail message waiting text line. It is sent to the clients and saved in the call log when a Message Waiting Indicator is received.

It has the {CALLTYPE} Category Structure, however, NAME and NMBR will have text. See the CALL: definition in the Gateway-to-Server section.

Example for US telcos:

```
MWI: *DATE*04172018*TIME*2005*LINE*HOME*NMBR*Voicemail*MESG*NONE*
                    NAME*Message(s) Waiting*
MWI: *DATE*04172018*TIME*2136*LINE*HOME*NMBR*Voicemail*MESG*NONE*
                    NAME*No Messages Waiting*
```

Example for UK telcos:

```
MWI: *DATE*04222018*TIME*1303*LINE*HOME*NMBR*Voicemail*MESG*NONE*
                    NAME*1 Message Waiting*
MWI: *DATE*04222018*TIME*1619*LINE*HOME*NMBR*Voicemail*MESG*NONE*
                    NAME*5 Messages Waiting*
MWI: *DATE*04232018*TIME*0839*LINE*HOME*NMBR*Voicemail*MESG*NONE*
                    NAME*No Messages Waiting*
```

- *NOT:*

A notification text line of a smartphone message. It is sent to all clients and saved in the call log.

It has the {MSGTYPE} Category Structure for Server Output Lines.

Examples:

```
NOT: PHONE 4012: PING Test notification ***DATE ...
NOT: PHONE 7cd0: SMS from mail@nowhere.com ***DATE ...
```

- *OUT:*

An outgoing call text line.

It has the {CALLTYPE} Category Structure.

- *PID:*

A smartphone incoming Caller ID text line sent to NCID. It uses the PID: label instead of the CID: label because the ncid-page client output module can be configured to send CID: and MSG: text lines to smartphones. This could cause the same message to be sent back and forth in an infinite loop if CID: or MSG: were used.

It has the {CALLTYPE} Category Structure.

- *PUT: (new in API 1.7)*

A smartphone outgoing Caller ID text line sent to NCID. It uses the PUT: label instead of the OUT: label.

It has the {CALLTYPE} Category Structure.

- *RID: (new in API 1.7)*

A Ring Back Caller ID text line. Ring back is a service offered by some telcos. On making a telephone call to a number that is engaged (busy), automatic ring back is a service provided by the telco whereby, when the called number becomes available, the caller is rung back, usually with a distinctive "ring back" ring.

It has the {CALLTYPE} Category Structure.

- *WID: (new in API 1.1)*

A Call Waiting Caller ID text line.

It has the {CALLTYPE} Category Structure.

GATEWAY IMPLEMENTATION

- *connect to port 3333 or whatever port is specified in server configuration*
- *receive a 200 server version text message*
- *receive a 210 server API version text message*
- *(New in API 1.5) immediately after receiving a 210 line, send zero or more HELLO: lines*
- *if no call log sent, receive a 251 Call log not sent or a 252 Call log empty or a 253 No Call log message (ignore)*
- *if call log sent, receive a 250 Call log sent message (ignore)*
- *(New in API 1.5) if a server setting is being temporarily overridden by a HELLO: CMD: <command> line, clear the override so it will not apply to future connections.*
- *receive zero or more OPT: <option> lines (ignore)*
- *receive a 300 End of server startup message*
- *connect to the Caller ID service (SIP, YAC, etc)*
- *when incoming CID information is obtained from the service, send the data to the server in the CALL: text line format with IN in the CALL<type> field*
- *for all other {CALLTYPE}, send the data to the server in the CALL: text line format with the appropriate line type (e.g., WID) in the CALL<type> field*

(note: "hangup" in the context below does not mean calls automatically terminated by Internal Hangup or Hangup Extensions; it refers to hangups triggered by a phone user or the telco):

- *if hangup is detected before answer, send the data to the server in the CALLINFO: CANCEL text line format*
- *if hangup is detected after answer, send the data to the server in the CALLINFO: BYE text line format*
- *if the gateway receives a notice of a smartphone message, send the data to the server in the NOT: text line format with IN in the MTYPE field*
- *if the gateway sends a smartphone message, send the data to the server in the NOT: text line format with OUT in the MTYPE field (optional)*

Gateway-to-Server

When the gateway sends information to the server, it sends the data as lines of text that start with a line label. This defines line types. The current line labels are:

- *CALL:*

A gateway Caller ID text line. It is sent to the server and converted into a CID: or other {CALLTYPE} text line when a call is received. The text line is comprised of field pairs, one contains the field name and the following field contains the field data. Fields are separated by ..., the first field starts after ### and the last field ends in +++:

`CALL: ###DATE<datetime>...CALL<type>...LINE<lineid>...NMBR<number>... NAME<name>+++`

The CALL: line has the following field pairs (field label and field data):

<label><data>	*Description*
###	*start of the information part of the message being sent to the server*

DATEdatetime	*where datetime is mmddhhmm or ddmmhhmm , m = month, d = day, h = hour, m = minute*
...	*field separator*
CALLtype	*where type is IN, CID, or other {CALLTYPE}*
...	*field separator*
LINElineid	*where lineid is the phone line identifier, NO-LINE or -*
...	*field separator*
NMBRnumber	*where number is the caller's phone number, NO-NUMBER or -*
...	*field separator*
NAMEname	*where name is the caller's name, NO NAME or -*
+++	*end of the information part of the message*

- *If the gateway is on a smartphone or connects to a smartphone, the CALLtype must be PID for incoming calls or PUT for outgoing calls. (PUT is new in API 1.7.)*
- *(New in API 1.7) If the telco transmits a Message Waiting Indicator, the CALLtype must be MWI.*
- *The telco is not expected to supply DATEdatetime and NMBR so the gateway must fill these in as follows:*
  - *use current date and time for the DATEdatetime field*
  - *use the text 'Voicemail' for NMBR*
- *The gateway must fill in NAME depending on the kind of MWI sent by the telco, which is usually one of two types:*
  - *a simple on/off MWI, usually used by US telcos, in which case NAME should contain the text 'Message(s) Waiting' or 'No Messages Waiting' respectively. An "off" status would be sent only to transition from the MWI being "on".*
  - *a count of the messages waiting, usually used by UK telcos, in which case NAME should have the text '1 Message Waiting', '2 Messages Waiting', etc., up to the maximum of '255 Messages Waiting'. The text 'No Messages Waiting' should be in NAME when there's a transition from one or more messages waiting, to zero, after they have all been listened to.*

Example for US telcos:

```
CALL: ###DATE04172005...CALLMWI...LINEHOME...NMBRVoicemail...
                        NAMEMessage(s) Waiting+++
CALL: ###DATE04172136...CALLMWI...LINEHOME...NMBRVoicemail...
                        NAMENo Messages Waiting+++
```

Example for UK telcos:

```
CALL: ###DATE04221303...CALLMWI...LINEHOME...NMBRVoicemail...
                        NAME1 Message Waiting+++
CALL: ###DATE04221619...CALLMWI...LINEHOME...NMBRVoicemail...
                        NAME5 Messages Waiting+++
CALL: ###DATE04230839...CALLMWI...LINEHOME...NMBRVoicemail...
                        NAMENo Messages Waiting+++
```

- *CALLINFO:*

A text line that indicates the telephone lineid and call start/end information. It is sent to the server and converted into an END: text line when a call completes. The text line is comprised of field pairs, the first contains the field name and the second contains the field data. Fields are separated by ..., the first field starts after ### and the last field ends in +++. The call start/end information is only obtained from gateways that provide such info:

```
CALLINFO: ###<end>...DATE<datetime>...SCALL<dt>...ECALL<dt>...CALL<io>...
LINE<lineid>...NMBR<tn>...NAME<name>+++
```

The CALLINFO: line has the following fields:

<label><data>	*Description*
###	*start of the information part of the message being sent to the server*
end	*where end is either BYE or CANCEL*
...	*field separator*
DATEdatetime	*where datetime is mmddhhmm or ddmmhhmm, m = month, d = day, h = hour, m = minute*
...	*field separator*
SCALLdate time	*where start of call date is mm/dd/yyyy, a space and time is hh:mm:ss in 24-hour format, m = month, d = day, y = year, h = hour, m = minute, s=second*
...	*field separator*
ECALLdate time	*where end of call date is mm/dd/yyyy, a space and time is hh:mm:ss in 24-hour format, m = month, d = day, y = year, h = hour, m = minute, s=second*
...	*field separator*
CALLio	*where type is either IN or OUT (this is not a pass through of the CALL: CALLtype)*
...	*field separator*
LINElineid	*where lineid is the phone line identifier, NO-LINE or -*
...	*field separator*
NMBRnumber	*where number is the caller's phone number, NO-NUMBER or -*
...	*field separator*
NAMEname	*where name is the caller's name, NO NAME or -*
+++	*end of the information part of the message*

- *GOODBYE (new in API 1.6) (note that there is no trailing colon)*

The definition of GOODBYE lines for gateways is the same as for Feature Set 1 clients. Unless otherwise noted, changes made to GOODBYE lines in API version 1.6 and higher will apply equally to clients and gateways. Click here to go to the Feature Set 1 definition of GOODBYE lines.

- *HELLO: (new in API 1.5)*

The definition of HELLO: lines for gateways is the same as for Feature Set 1 clients, except that the word 'client' at the beginning of the HELLO: IDENT: <ident> string is replaced with the word 'gateway'. Unless otherwise noted, changes made to HELLO: lines in API version 1.5 and higher will apply equally to clients and gateways. Click here to go to the Feature Set 1 definition of HELLO: lines.

- *MSG: (gateway alerts)*

A text line containing a gateway alert that is sent to the server, saved in the call log and then sent to clients. It has free-form text only and no field pairs.

It has the {MSGTYPE} Category Structure for Server/Gateway Alerts.

Example of an ncid2ncid gateway alert:

```
MSG: fromhost1 fedora-server:3333 reconnected
```

- *MSG: (gateway output)*

A text line containing a gateway message that is sent to the clients and saved in the call log.

It has the {MSGTYPE} Category Structure for Client/Gateway Output Lines.

- *NOT:*

A notification text line of a smartphone message. It is sent to the server and converted into a NOT: text line when a smartphone notification is received.

It has the {MSGTYPE} Category Structure for Client/Gateway Output Lines.

Forwarding Gateway (Server-to-Server) (new in API 1.4)

You might want to implement a Forwarding Gateway in the following scenarios:

- *You have two or more instances of ncidd running to monitor separate modems and you want clients to display call activity from both (or more) modems. Most clients can connect to only one ncidd instance at a time, but by using a Forwarding Gateway you can combine the call activity from several sending servers to a single receiving server. Then, all clients would connect to the single receiving server.*
- *You have two or more instances of ncidd running on separate network subnets.*

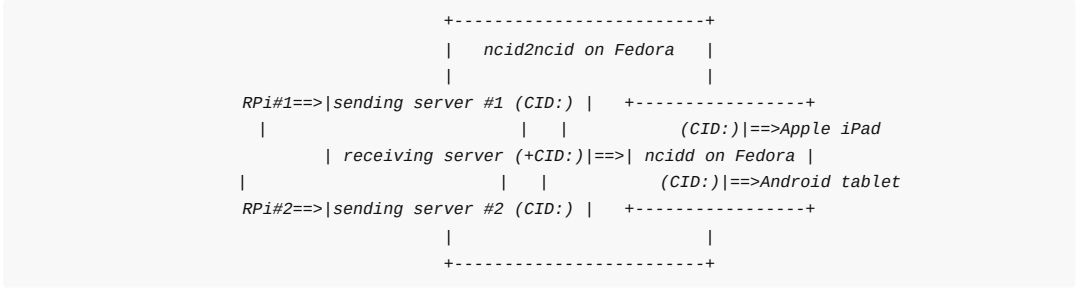
Distributed with NCID is the ncid2ncid gateway which allows up to four sending servers to be combined and transmitted to a single receiving server.

There needs to be a method to distinguish which call activity is being forwarded. This method involves prefixing line types with a "+". When ncid2ncid collects call activity from the sending servers, it adds the "+" before transmitting it to the single receiving server. The receiving server (an instance of ncidd) strips the "+" and sends the call activity to all listening clients.

Here's a hypothetical example: Two Raspberry Pi computers are running ncidd and each have their own modem to monitor. A third computer running Fedora has no access to modems but does have an Apple iPad and an Android tablet connecting as ncid clients. All of these devices are on the same network subnet.

- *RPi #1, IP address 192.168.9.101, port 3333*
- *RPi #1, IP address 192.168.9.102, port 3334*
- *Fedora, IP address 192.168.9.111, port 3335*
- *Apple iPad and Android tablet both configured to connect to the Fedora computer, port 3335.*

This will require ncid2ncid to be configured such that RPi#1 and RPi#2 are two sending servers and the Fedora computer is the receiving server.



CLIENT IMPLEMENTATION

- *implement a Feature Set 1 client*
- *(New in API 1.5) send zero or more HELLO: lines at connect*
- *if a call log is received, it may also:*
  - *contain XXXLOG: text lines where XXX is one of the {CALLTYPE} or {MSGTYPE} designated Feature Set 2 in the Categories table; these should be parsed and displayed*
  - *contain ENDLOG: text lines which can be optionally parsed and displayed*
- *receive zero or more OPT: <option> lines*
- *receive a 300 End of server startup message*
- *configure options received by OPT: lines*

(New in API 1.3) Unless otherwise noted, all OPT: lines output by the server are for informational and troubleshooting purposes only. Clients can optionally make use of them by giving the user a way to display them. Otherwise, clients are not required to display them, do not need to take any action on them and can safely ignore them. See Feature Set 1 OPT: definition and Feature Set 1: Client Implementation for more information.

- *possibly receive a CIDINFO: at the end of the call*
- *possibly receive any of the {CALLTYPE} or {MSGTYPE} designated Feature Set 2 in the Categories table*
- *possibly receive an END: line whenever a call completes*
- *ignore all other lines*

Optional Client-to-Module

The optional client module lines are the same as in Feature Set 1, except the call or message type list is expanded and includes the {CALLTYPE} and {MSGTYPE} designated Feature Set 2 in the Categories table.

(New in API 1.5) Send zero or more HELLO: lines at connect. In particular, sending a HELLO: CMD: no_log line can improve performance because it forces the server not to send the call log.

Feature Set 3: Client Job Support

*A client can send a "job" to the server to control certain server features and/or to query/update certain server settings. As an example, a connected client can trigger the creation of an entry in **ncidd.alias**, or add a phone number to **ncidd.blacklist**, on-the-fly.*

The majority of the Client Jobs sent by a client are completed immediately by the server and the server sends back the results. No further interaction between the client and server is needed.

*The exceptions are the REQ: UPDATE and REQ: UPDATES Client Jobs (commands). These work by having the server create temporary copies of the call log(s) and then applying alias updates to them. The server sends back a summary to the user of what **will** be changed. The server is then free to accept the next set of Client Jobs from any connected client.*

NOTE: The server does not support concurrent clients issuing the REQ: UPDATE and REQ: UPDATES Client Jobs. This is not enforced.

The temporary call log(s) remain in a limbo state until the server receives a WRK: <command> line type. When <command> indicates acceptance, the server removes the original call log(s) and replaces them with the temporary one(s). When <command> indicates rejection (cancellation), the server removes the temporary call log(s).

When you use Client Jobs, you need to keep in mind their effect on the state of the alias, blacklist and whitelist tables in the server's memory and the effect on the current call log that may already be loaded by all connected clients.

- *Updates to the alias, blacklist and whitelist files execute the external **ncidutil** tool via the REQ: <alias|black|white> commands. The client that performs these changes should follow up with a REQ: RELOAD request to update the server's tables in memory. Such changes are then immediately available to all connected clients as call activity continues. You can batch the updates by sending several changes in a row, followed by a single REQ: RELOAD request.*
- *Updates to call log(s) execute the external **cidupdate** tool via REQ: UPDATE | UPDATES commands. The client that performs these changes should follow up with a REQ: REREAD request to have the modified current call log resent to the client. You can batch the updates by sending several changes in a row, followed by a single REQ: REREAD request. Only the client that requests the REQ: REREAD will be updated; all other connected clients will either need to be manually restarted, or manually execute a REQ: REREAD request.*

OVERVIEW OF AVAILABLE CLIENT JOBS

Client Jobs are initiated when clients send REQ: line types to the server. The general format is:

REQ: <command> [<arguments>]

When an already-initiated Client Job requires additional information from the user, the client will send WRK: line types to the server. The general format is:

WRK: <command> <arguments>

Commands and arguments are case sensitive.

See the table at the beginning of Client Job Examples for brief descriptions of each REQ: and WRK: command.

At a minimum, the Client Jobs needed to query and add an alias are as follows. Blacklist/whitelist queries and updates are similar.

Step	*Job Request*	*What it does*
1	*REQ: INFO <number>&& <name>*	*Check to see if an entry exists in alias/blacklist/whitelist*

2	REQ: alias <add> <arguments>	Write a new entry to **ncidd.alias**
3	REQ: RELOAD	Force the NCID server to reload the modified alias list
4	REQ: UPDATE | UPDATES	Allow the user to preview the update to the call log(s)
5	WRK: ACCEPT LOG | LOGS	User commits the update(s)
6	REQ: REREAD	Force the server to resend the updated current call log to the client performing the update

SERVER IMPLEMENTATION

- *when a client establishes a connection to the server, send a list of server-supported Client Job options to client, one OPT: <option> line for each option, just before sending 300 End of server startup message*
- *process user-initiated Client Jobs in response to client REQ: and WRK: requests*

Server Output Lines

The general structure of Server Output Lines consists of three line types: a start-of-server-data line, one or more lines of the server data, then an end-of-server-data line.

Each start-of-server-data line is paired with a specific end-of-server-data line as indicated below. For clarity, lines are indented to show their logical structure.

- ```
  400 Start of data requiring OK
      INFO: <data returned for the request>
      INFO: <data returned for the request>
      ...
  410 End of data
  ```

- ```
  401 Start of data requiring ACCEPT or REJECT
      INFO: <data returned for the request>
      INFO: <data returned for the request>
      ...
  410 End of data
  ```

- ```
  402 Start of data showing status of handled request
      RESP: <a server output line>
      RESP: <a server output line>
      ...
  411 End of response
  ```

- ```
  403 Start of data defining permitted requests
      INFO: <data returned for the request>
      INFO: <data returned for the request>
      ...
  411 End of response
  ```

The contents of the INFO: and RESP: lines depend entirely on the Client Job being processed.

For example, if a client sends a REQ: REREAD request ("resend call log"), the server will output line types 250 - 254, OPT: and 300 exactly as specified in Feature Set 1: Modem and Device Support. Their definitions are not included below.

The rest of this section contains the definitions of each server output line type for Client Jobs.

- *400*

Start of data that the client should present to the user for acknowledgment. The data is in the form of one or more INFO: lines and ends with 410.

(Added in API 1.2) Nothing is sent back to the server.

```
400 Start of data requiring OK
```

- *401*

Start of data that requires ACCEPT or REJECT from client (a client should follow up with an appropriate WRK: response). The data is in the form of one or more INFO: lines and ends with 410.

```
401 Start of data requiring ACCEPT or REJECT
```

- *402*

Start of data showing the server results of a Client Job. The data is in the form of one or more RESP: lines and ends with 411.

```
402 Start of data showing status of handled request
```

- *403*

When a Client Job is submitted, the server will validate the request and send back one or more INFO: lines to indicate what actions the client can do next, followed by an ending 411 line.

For example, a Client Job can request the status of a phone number and as part of the server response there will be an indication as to whether the phone number is present or not in the blacklist. This tells the client making the request whether it can give the user the option to remove it from, or add it to, the blacklist.

```
403 Start of data defining permitted requests
```

- *410*

End of data returned from server. Used to end 400 and 401 server messages:

```
410 End of data
```

- *411*

End of response. Used to end 402 and 403 server messages:

```
411 End of response
```

- *INFO:*

The server will send an appropriate beginning 40x line, then one or more INFO: lines and finally an ending 41x line.

The server outputs INFO: lines in one of two formats:

- *Format 1: Free form text, with as many INFO: lines as needed.*

It will have a beginning 401 line, then the INFO: lines and finally an ending 410 line.

- *Format 2: A specific structure unique to REQ: INFO requests.*

It will have a beginning 403 line, then the INFO: lines and finally an ending 411 line.

- *RESP:*

The server will send a 402 line, then one or more RESP: lines and finally an ending 411 line.

The server sends one RESP: line for each line of server output.

```
RESP: <a server output line>
```

- *RPLY: dial - <status>*

Send the client the status of a REQ: DIAL|DIAL_ABORT Client Job, where <status> can be one of:

```
hungup <number> on line "<lineid>"

dial failed, modem returned <error text from modem>

format error: <error text from modem>
```

A RPLY: line normally follows the server 411 response to REQ: DIAL|DIAL_ABORT. However, this is not guaranteed and a client should expect RPLY: at any time.

CLIENT IMPLEMENTATION

If you want to implement a client to take advantage of Client Jobs:

- *you will likely want to design a GUI as Client Jobs are intended to interact with a user*
- *client must process server options (OPT: lines) which are provided just before a 300 End of server startup line*

(New in API 1.3) Unless otherwise noted, all OPT: lines output by the server are for informational and troubleshooting purposes only. Clients can optionally make use of them by giving the user a way to display them. Otherwise, clients are not required to display them, do not need to take any action on them and can safely ignore them. See Feature Set 1 OPT: definition and Feature Set 1: Client Implementation for more information.

A graphical NCID client will typically have the following features:

- *A window displaying contents of the current call log (a.k.a. call history). When the user selects a displayed line, the client will initiate a REQ: INFO alias request to find out what actions are permitted for the caller phone number and name on that line (e.g., if there is no alias give an option to add a new one, if the number is on the blacklist/whitelist give an option to remove it, etc.).*
- *Provide a way for the user to manually force the server to reload the server's alias, blacklist and whitelist files via a REQ: RELOAD request.*
- *(Removed in API 1.3) ~~only if the server sends OPT: hangup will the user have an option to force the server to reload the blacklist/whitelist files~~*
- *Provide a way for the user to manually force the server to update the current call log or all call logs with aliases via the REQ: UPDATE | UPDATES request.*
- *Provide a way for the user to manually force the server to resend the current call log to the client via the REQ: REREAD request.*
- *(New in API 1.6) When the user selects a displayed line, provide a way to dial a number, or abort a dial in progress.*
- *(New in API 1.6) Monitor the server for RPLY: lines. These give the success/fail result of dialing a number. Display to the user as appropriate.*

Client-to-Server

Client Jobs are initiated when clients send REQ: line types to the server. The general format is:

- *REQ: <command> [<arguments>]*

where <command> is one of the following:

alias | black | white | DIAL | DIAL_ABORT | INFO | PAUSE | RELOAD | REREAD | UPDATE | UPDATES

- *(New in API 1.6) The DIAL and DIAL_ABORT commands were added to the above list.*
- *(New in API 1.12) The PAUSE command was added to the above list.*

When an already-initiated Client Job requires additional information from the user, the client will send WRK: line types to the server. The general format is:

- *WRK: <command> <arguments>*

where <command> <arguments> is one of the following:

ACCEPT LOG | ACCEPT LOGS | REJECT LOG | REJECT LOGS

Commands and arguments are case sensitive.

The following Client Jobs are supported.

- *REQ: alias add "<number>&&<alias>" "<type>&&<name>"*

Add to alias list. A client would typically offer the user the option to add an item to the alias list if the INFO: alias line returned NOALIAS.

where:

- *number is from the call log*
- *alias is input from the user*
- *type is the alias type or NOALIAS if none*
- *name is from the call log*

- *REQ: alias modify "<number>&&<alias>" "<type>&&<name>"*

Modify alias. A client would typically offer the user the option to modify an alias if the INFO: alias line did not return NOALIAS.

where:

- *number is from the call log*
- *alias is new alias*
- *type is the alias type or NOALIAS if none*
- *name is from the call log*

Modifying an alias and specifying a new alias of nothing (null) is the same as removing an existing alias.

- *REQ: alias remove "<number>&&" "<type>&&<name>"*

Remove alias. A client would typically offer the user the option to modify an alias if the INFO: alias line did not return NOALIAS.

where:

- *number is from the call log*
- *type is the alias type or NOALIAS if none*
- *name is from the call log*

- *REQ: black add "<item>" "<comment>"*

Add an item to the blacklist. Item is the name or number from the call log file. A client would typically offer the user the option to add an item to the black list if the INFO: response line was INFO: neither.

(Removed in API 1.1) ~~The server must have sent and the client must have received, OPT: hangup to enable this Client Job.~~

- *REQ: black remove "<item>" ""*

Remove from black list. Item is the name or number from the call log file. A client would typically offer the user the option to remove an item from the black list if the INFO: response was either INFO: black name or INFO: black number.

(Removed in API 1.1) ~~The server must have sent and the client must have received, OPT: hangup to enable this Client Job.~~

- *REQ: white add "<item>" "<comment>"*

Add to white list. Item is the name or number from the call log file. A client would typically offer the user the option to add an item to the white list if the INFO: response line was INFO: neither.

(Removed in API 1.1) ~~The server must have sent and the client must have received, OPT: hangup to enable this Client Job.~~

- *REQ: white remove "<item>" ""*

Remove from white list. Item is the name or number from the call log file. A client would typically offer the user the option to remove an item from the white list if the INFO: response line was either INFO: white name or INFO: white number.

(Removed in API 1.1) ~~The server must have sent and the client must have received, OPT: hangup to enable this Client Job.~~

- *REQ: <DIAL|DIAL_ABORT> <number>&&<name>&&<lineid> (new in API 1.6)*

Use a modem locally connected to the server to dial <number>. <name> is provided for display purposes only.

When the server has more than one modem configured for dialing out, <lineid> specifies which modem, e.g., POTS, HOME, etc, should be used. If the lineid does not match a configured modem, the server may choose one.

The number, name and lineid are separated by &&.

No check is made to see if <number> is blacklisted; blacklisted numbers can be dialed.

Use the REQ: DIAL_ABORT line to cancel a dial in progress.

Once the server has issued the ATDT command, it must start a dial delay timer (a minimum of 5 seconds is suggested) and proceed with its normal polling process to check for client/gateway connections and data, including a possible REQ: DIAL_ABORT Client Job. While the dial delay timer counts down, the server must monitor and react to the status of the modem.

If the timer reaches zero without detecting a problem, the dial is considered successful and assumes the user has picked up the line. The server then sends a modem ATH0 command sequence to disconnect from the phone line; as long as the user is still talking to the dialed party, the call itself will not be terminated.

When the dial's success, user abort, or failure is determined, the server will send the dial status using the RPLY: line type. It gets sent to the client that initiated the dial.

The server will generate an OUT: line if the number is successfully dialed.

A special case exists where other devices can detect outgoing calls. In order to avoid creating a duplicate OUT: line, a server needs to check all HELLO: IDENT: <ident> lines for the presence of the uppercase text [OUT] following the version. When found, a flag is set to prevent the server from generating the OUT: line.

For example, the sip2ncid gateway can detect outgoing calls. It depends on the SIP implementation of the Telco or VoIP provider. When sip2ncid connects to the server, the <ident> string will have [OUT], so set a flag. If REQ: DIAL is successful, it is assumed that sip2ncid will have generated the OUT: as part of its normal processing.

- *REQ: INFO <number>&&<name>*
  REQ: INFO <number>&&<name>&&<lineid>

  Request the status of alias, blacklist and whitelist for a given number, name and optional lineid.

  (New in API 1.6) Also requests the status of whether the number can be dialed.

  The number, name and optional lineid are separated by &&.

  To retrieve the alias status for number and name, there must be an exact match on both.

  To retrieve the alias status for the optional lineid, there must be an exact match on the lineid.

  To retrieve whitelist and blacklist status, either number, name, or both number and name can match the blacklist or whitelist entry (i.e. both number and name do not have to match, but one of them must match).

  The server responds with three INFO: lines that have the following general format:

  - *First INFO: line contains alias status:*

    `INFO: alias <name|number type> "<entry>" [<lineid type>] "<entry>"`

    where <name|number type> can be one of:

    NOALIAS | NMBRONLY | NAMEONLY | NMBRNAME | NMBRDEP | NAMEDEP

    and <lineid type> can be one of:

    NOALIAS | LINEONLY

    if alias or lineid is NOALIAS then entry is ""

  - *Second INFO: line contains blacklist and whitelist status:*

    `INFO: <status>`

    where <status> can be one of:

    neither
    `black name|number "<entry>"`
    `white name|number "<entry>"`
    `both name|number "<white entry>" "<black entry>"`

  - *(New in API 1.6) Third INFO: line indicates whether the server has been enabled to dial the number using a locally attached modem:*

    `INFO: dial <status>`

where <status> can be one of:

NODIAL | <number>&&<name>

- *REQ: PAUSE <minutes> (new in API 1.12)*

where <minutes> can be one of:

-1 | 0 | <minutes>

A value of -1 will query the server's remaining pause time and return it to the client.
A value of 0 will immediately resume normal Internal Hangup and external Hangup Extension(s).
<minutes> to temporarily disable the server's Internal Hangup and external Hangup Extension(s) for a duration of <minutes>.

No maximum is defined or enforced by the server but it is recommended that clients limit a user to 600 minutes (10 hours).

The server will resume automatic hangup at the end of the pause time or when the client requests an end to the pause time. You might want to use this new feature if you are expecting a legitimate call but you don't yet have the phone number. Once they call you, you can then whitelist the caller using the normal means.

- *REQ: RELOAD*

Reload alias, blacklist and whitelist files.

(Removed in API 1.3) ~~(the blacklist and whitelist files will not be reloaded unless the server OPT: hangup option is received)~~

- *REQ: REREAD*

Request that the server resend the call log. It is only sent to the client issuing REQ: REREAD. The server responds with line types 250 - 254, OPT: and 300 exactly as specified in Feature Set 1: Modem and Device Support.

- *REQ: UPDATE*

*Make a temporary copy of the **current** call log to process any alias changes. This executes the external **cidupdate** tool. See also Note 1 and Note 2 below.*

- *REQ: UPDATES*

*Make temporary copies of **all** call logs to process any alias changes. This executes the external **cidupdate** tool. See also Note 1 and Note 2 below.*

- *WRK: ACCEPT LOG*

*The user has indicated that changes to the **current** call log by REQ: UPDATE have been accepted. This causes the original call log to be removed and replaced with the temporary call log. See also Note 1 and Note 2 below.*

- *WRK: REJECT LOG*

*The user has indicated that changes to the **current** call log by REQ: UPDATE have been rejected. This causes the temporary call log to be removed and no permanent updates take place. See also Note 1 below.*

- *WRK: ACCEPT LOGS*

*The user has indicated that changes to **all** call logs by REQ: UPDATES have been accepted. This causes the original call logs to be removed and replaced with the temporary call logs. See also Note 1 and Note 2 below.*

- *WRK: REJECT LOGS*

*The user has indicated that changes to **all** call logs by REQ: UPDATES have been rejected. This causes the temporary call logs to be removed and no permanent updates take place. See also Note 1 below.*

Note 1: Clients are responsible for keeping track of pending call log updates initiated by REQ: UPDATE | UPDATES. The temporary call logs will remain on the server indefinitely until a client sends a WRK: command.

*Note 2: The **cidupdate** tool preserves the date/time stamp of the original call log(s) when replacing them with the temporary log(s).*

REQUIREMENTS FOR DIAL-A-NUMBER CLIENT JOB (new in API 1.6)

lineid

The lineid is not the operating system device name, i.e., it is not /dev/ttyACM0 or COM1: or similar.

Click on the links to be taken to the complete definition:

- *The REQ: DIAL Client Job uses lineid to allow the user to select which modem will be used to dial the number.*
- *The REQ: INFO Client Job uses the optional lineid only to check whether there is an alias for lineid. The associated INFO: dial server response does not return a lineid on purpose because the user, not the server, chooses the lineid for dialing.*

Server Implementation

The server considers the dial-a-number feature to be enabled if all of the following are true:

- ***ncidd.conf::cidinput** indicates an "AT" modem is attached*
- *the modem was successfully initialized when ncidd was started*
- *the REQ: INFO number to be dialed consists of only digits*

If the above conditions are not met, the server will respond to the REQ: INFO Client Job with the following third INFO: line:

```
INFO: dial NODIAL
```

The server does not modify the number to be dialed. It is passed as-is to the modem and dialed using a normal modem ATDT command sequence.

The server does not care if a number is blacklisted or not. A blacklisted number can be dialed like any other number.

Client Implementation

The client usually interacts with the user by presenting the current call history and allowing a line to be selected. No validation of the selected line type (CID:, HUP:, NOT:, etc.) should be needed because it is the NMBR field pair that ultimately determines the number to dial.

It is the responsibility of the client initiating this Client Job to make sure it sends the proper leading digits to handle long distance calls, send country codes, access outside lines, etc.

The client can optionally validate the number somewhat: number of digits, not all zeros, proper area code, no 555-01XX fictional numbers, etc. This validation is optional because it needs to be country specific.

If the client's number validation fails, the REQ: DIAL Client Job should not be sent to the server.

CLIENT JOB EXAMPLES

Clicking on the Job Request will show examples of the Client/Server exchanges.

Clicking on the (client) link in the table below will take you to more detailed information and is usually the place you want to start. Clicking on the (server) link takes you to an appropriate Server Output section.

Job Request	*Description*
REQ: alias <add|modify|remove>	*(client) (server 402) Manipulate entries in alias file*
REQ: black <add|remove>	*(client) (server 402) Manipulate entries in blacklist file*
REQ: white <add|remove>	*(client) (server 402) Manipulate entries in whitelist file*
REQ: DIAL <number>&&<name>&&<lineid> *REQ: DIAL_ABORT <number>&&<name>&&<lineid>*	*(client) (server 402) Dial a number (new in API 1.6)*
REQ: INFO <number>&&<name> *REQ: INFO <number>&&<name>&&<lineid>*	*(client) (server 403) Query alias, blacklist and whitelist status for a given number, name and/or lineid*
REQ: PAUSE <minutes>	*(client) (server 402) Pause hangup for a number of minutes (new in API 1.12)*
REQ: RELOAD	*(client) (server 400) Force the NCID server to reload alias, blacklist and whitelist tables into the server's memory*
REQ: REREAD	*(client) (server) Force the NCID server to resend the **current** call log to the client*
REQ: UPDATE	*(client) (server 401) Temporarily update the **current** call log to process any alias changes. Changes are made permanent only if client responds with WRK: ACCEPT LOG.*
REQ: UPDATES	*(client) (server 401) Temporarily update **all** call logs to process any alias changes. Changes are made permanent only if client responds with WRK: ACCEPT LOGS.*
WRK: ACCEPT LOG	*(client) (server) Accept and make permanent the server's temporary updates to the **current** call log*
WRK: REJECT LOG	*(client) (server) Reject (cancel) the server's temporary updates to the **current** call log*
WRK: ACCEPT LOGS	*(client) (server) Accept and make permanent the server's temporary updates to **all** call logs*
WRK: REJECT LOGS	*(client) (server) Reject (cancel) the server's temporary updates to **all** call logs*

Below are examples of the Client/Server exchanges for Job Requests.

*REQ: and WRK: lines are generated by the client. For readability, server responses are indented and long lines split using the "" continuation character. For brevity, the full paths to **ncidutil**, **cidupdate**, **ncidd.alias**, **ncidd.blacklist**, **ncidd.whitelist** and **ncidd.conf::cidlog** have been removed.*

The majority of the alias examples use the NAMEDEP type ("change the name depending on the phone number") since it is most widely used.

- *REQ: alias <add|modify|remove> "<number>&&<alias>" "<type>&&<name>"*

- *First check to see if there is already an alias on file....*

```
REQ: INFO 4075551212&&WIRELESS

403 Start of data defining permitted requests
INFO: alias NOALIAS "" NOALIAS ""
INFO: neither
INFO: dial 4075551212&&WIRELESS
411 End of response
```

- *We got `alias NOALIAS` for a call, so add it...., the second NOALIAS is for a lineid.*

```
REQ: alias add "4075551212&&John on Cell" "NAMEDEP&&WIRELESS"
```

```
ncidutil --ignore1                                  \
         --multi "ncidd.blacklist ncidd.whitelist"  \
         "ncidd.alias" Alias add                    \
         "4075551212&&John on Cell"                 \
                   "NAMEDEP&&WIRELESS" 2>&1
  402 Start of data showing status of handled request
              RESP: Modified:  ncidd.alias
RESP:    added: alias NAME * = "John on Cell" if 4075551212
                        RESP: Done.
                  411 End of response
```

- *Modify it....*

```
REQ: alias modify "4075551212&&John's iPhone" "NAMEDEP&&John on Cell"

         ncidutil --ignore1                                  \
                  --multi "ncidd.blacklist ncidd.whitelist"  \
                  "ncidd.alias" Alias modify                 \
                  "4075551212&&John's iPhone"                \
                           "NAMEDEP&&John on Cell" 2>&1
           402 Start of data showing status of handled request
                        RESP: Modified: ncidd.alias
       RESP:     from: alias NAME * = "John on Cell" if "4075551212"
             RESP:       to: alias NAME * = "John's iPhone" if
                                            "4075551212"
                                 RESP: Done.
                           411 End of response
```

- *Remove it....*

```
REQ: alias remove "4075551212&&" "NAMEDEP&&John's iPhone"

   ncidutil --ignore1                                  \
            --multi "ncidd.blacklist ncidd.whitelist"  \
            "ncidd.alias" Alias remove                 \
              "4075551212&&" "NAMEDEP&&John's iPhone" 2>&1
      402 Start of data showing status of handled request
                   RESP: Modified: ncidd.alias
         RESP:  removed: alias NAME * = "John's iPhone" if
                                        "4075551212"
                                RESP: Done.
                           411 End of response
```

Note that the following are equivalent and are treated as "alias remove" because the new "...&&<alias>" is null.

```
REQ: alias modify "4075551212&&" "NAMEDEP&&John's iPhone"
REQ: alias remove "4075551212&&" "NAMEDEP&&John's iPhone"
```

- *REQ: black <add|remove> "<number|name>" "<comment>"*
- *First check to see if there is already a blacklist entry on file....*

```
                REQ: INFO 4075551212&&WIRELESS

           403 Start of data defining permitted requests
                  INFO: alias NOALIAS "" NOALIAS ""
                            INFO: neither
                   INFO: dial 4075551212&&WIRELESS
                       411 End of response
```

- *We got `neither` (i.e., not in blacklist nor whitelist) so add it to blacklist based on the number and without a comment....*

```
                REQ: black add "4075551212" ""

          ncidutil "ncidd.blacklist" Blacklist add "4075551212" "" 2>&1
```

```
402 Start of data showing status of handled request
RESP: Modified: ncidd.blacklist
RESP:    added: 4075551212
RESP: Done.
411 End of response
```

- *Client sends REQ: RELOAD (not shown) to force server to update the table in the server's memory.*
- *Query the status....*

```
REQ: INFO 4075551212&&WIRELESS

403 Start of data defining permitted requests
INFO: alias NOALIAS
INFO: black number "4075551212"
INFO: dial 4075551212&&WIRELESS
411 End of response
```

- *We got `black number` as expected.*
- *Remove it...*

```
REQ: black remove "4075551212" ""

ncidutil "ncidd.blacklist" Blacklist remove "4075551212" "" 2>&1
402 Start of data showing status of handled request
RESP: Modified: ncidd.blacklist
RESP:  removed: 4075551212
RESP: Done.
411 End of response
```

- *Other miscellaneous examples that assume the blacklist file is empty and that a REQ: RELOAD (not shown) is done between updates....*
- *Add a new blacklisted number with a comment....*

```
REQ: black add "4075551212" "imposter!"

ncidutil "ncidd.blacklist" Blacklist add "4075551212" \
"imposter!" 2>&1
402 Start of data showing status of handled request
RESP: Modified: ncidd.blacklist
RESP:    added: 4075551212 # imposter!
RESP: Done.
411 End of response
```

- *Add a new blacklisted name with comment, then request status and notice `black name` in the response....*

```
REQ: black add "WIRELESS" "telemarketer"

ncidutil "ncidd.blacklist" Blacklist add "WIRELESS" \
"telemarketer" 2>&1
402 Start of data showing status of handled request
RESP: Modified: ncidd.blacklist
RESP:    added: WIRELESS # telemarketer
RESP: Done.
411 End of response

REQ: RELOAD

(server responses not shown)

REQ: INFO 4075551212&&WIRELESS
```

```
403 Start of data defining permitted requests
        INFO: alias NOALIAS "" NOALIAS ""
          INFO: black name "4075551212"
         INFO: dial 4075551212&&WIRELESS
             411 End of response
```

- *Add a new blacklisted number with a match name....*

```
REQ: black add "4075551212" "=Fax machine keeps calling"

ncidutil "ncidd.blacklist" Blacklist add "4075551212"  \
                "=Fax machine keeps calling" 2>&1
   402 Start of data showing status of handled request
              RESP: Modified: ncidd.blacklist
 RESP:    added: 4075551212 #=Fax machine keeps calling
                      RESP: Done.
             411 End of response
```

- *REQ: white <add|remove> "<number|name>" "<comment>"*

- *For the purpose of this example, before adding whitelist entries we'll create a blacklist entry to cover the entire area code 407 and include an appropriate comment...*

```
REQ: black add "^407" "blacklist all numbers in area code 407"

ncidutil "ncidd.blacklist" Blacklist add "^407"         \
          "blacklist all numbers in area code 407" 2>&1
   402 Start of data showing status of handled request
              RESP: Modified: ncidd.blacklist
RESP:    added: ^407 # blacklist all numbers in area code 407
                      RESP: Done.
             411 End of response
```

- *Client sends REQ: RELOAD (not shown) to force server to update the table in the server's memory.*
- *Check the status on two different phone numbers in area code 407...*

```
REQ: INFO 4075551212&&ORLANDO, FL

403 Start of data defining permitted requests
        INFO: alias NOALIAS "" NOALIAS"
        INFO: black number "4075551212"
       INFO: dial 4075551212&&ORLANDO, FL
             411 End of response

REQ: INFO 8002221515&&TOLL FREE

403 Start of data defining permitted requests
        INFO: alias NOALIAS "" NOALIAS ""
         INFO: black number "8002221515"
        INFO: dial 8002221515&&TOLL FREE
             411 End of response
```

- *We got `black number` as expected on both numbers. Add the first one to the whitelist based on the number and without a comment....*

```
REQ: white add "4075551212" ""

ncidutil "ncidd.whitelist" Whitelist add "4075551212" "" 2>&1
     402 Start of data showing status of handled request
              RESP: Modified: ncidd.whitelist
                RESP:    added: 4075551212
                      RESP: Done.
             411 End of response
```

```
REQ: RELOAD

(server responses not shown)
```

- Check the status on the numbers again...

```
REQ: INFO 4075551212&&ORLANDO, FL

403 Start of data defining permitted requests
INFO: alias NOALIAS "" NOALIAS ""
INFO: white number "4075551212"
INFO: dial 4075551212&&ORLANDO, FL
411 End of response
```

```
REQ: INFO 8002221515&&TOLL FREE

403 Start of data defining permitted requests
INFO: alias NOALIAS "" NOALIAS ""
INFO: black number "8002221515"
INFO: dial 8002221515&&TOLL FREE
411 End of response
```

- As expected, we got `white number` on the first one and `black number` on the second.
- Remove it...

```
REQ: white remove "4075551212" ""

ncidutil "ncidd.whitelist" Whitelist remove "4075551212" "" 2>&1
402 Start of data showing status of handled request
RESP: Modified: ncidd.whitelist
RESP: removed: 4075551212
RESP: Done.
411 End of response
```

- Other miscellaneous examples that assume the whitelist file is empty and that a REQ: RELOAD (not shown) is done between updates....
- Add a new whitelisted number with a comment....

```
REQ: white add "4075551212" "Lottery Commission"

ncidutil "ncidd.whitelist" Whitelist add "4075551212"  \
"Lottery Commission" 2>&1
402 Start of data showing status of handled request
RESP: Modified: ncidd.whitelist
RESP: added: 4075551212 # Lottery Commission
RESP: Done.
411 End of response
```

- Add a new whitelisted name with comment, then request status and notice `white name` in the response....

```
REQ: white add "ORLANDO, FL" "Chamber of Commerce"

ncidutil "ncidd.whitelist" Whitelist add "ORLANDO, FL"  \
"Chamber of Commerce" 2>&1
402 Start of data showing status of handled request
RESP: Modified: ncidd.whitelist
RESP: added: "ORLANDO, FL" # Chamber of Commerce
RESP: Done.
411 End of response

REQ: RELOAD
```

```
(server responses not shown)

REQ: INFO 4075551212&&ORLANDO, FL

403 Start of data defining permitted requests
INFO: alias NOALIAS "" NOALIAS ""
INFO: white name "ORLANDO, FL"
INFO: dial 4075551212&&ORLANDO, FL
411 End of response
```

- *Add a new whitelisted number with a match name....*

```
REQ: white add "4075551212" "=Walt Disney World"

ncidutil "ncidd.whitelist" Whitelist add "4075551212"   \
"=Walt Disney World" 2>&1
402 Start of data showing status of handled request
RESP: Modified: ncidd.whitelist
RESP:    added: 4075551212 #=Walt Disney World
RESP: Done.
411 End of response
```

- *REQ: <DIAL|DIAL_ABORT> <number>&&<name>&&<lineid> (new in API 1.6)*

- *Check the status of the number the user selected from call history...*
- *Server has NOT been configured to dial the number...*

```
REQ: INFO 4075551212&&WIRELESS&&POTS

403 Start of data defining permitted requests
INFO: alias NOALIAS "" NOALIAS ""
INFO: neither
INFO: dial NODIAL
411 End of response
```

- *Server HAS been configured to dial the number...*

```
REQ: INFO 4075551212&&WIRELESS&&POTS

403 Start of data defining permitted requests
INFO: alias NOALIAS "" NOALIAS ""
INFO: neither
INFO: dial 4075551212&&WIRELESS
411 End of response
```

- *User selects option in client to dial the number and chooses the option in the client to add a leading 1 for long distance The dial is successful...*

```
REQ: DIAL 14075551212&&WIRELESS&&POTS

402 Start of data showing status of handled request
RESP: Dialed number 14075551212 on line "POTS"
RESP: Pickup phone within 5 seconds
411 End of response

RPLY: dial - hungup 14075551212 on line "POTS"
```

- *Unsuccessful dial...*

```
REQ: DIAL 14075551212&&WIRELESS&&POTS

402 Start of data showing status of handled request
```

```
RESP: Dialed number 14075551212 on line "POTS"
RESP: Pickup phone within 5 seconds
411 End of response

RPLY: dial - dial failed, modem returned NO DIALTONE
```

- *Abort a dial in progress...*

```
REQ: DIAL 14075551212&&WIRELESS&&POTS

402 Start of data showing status of handled request
RESP: Dialed number 14075551212 on line "POTS"
RESP: Pickup phone within 5 seconds
411 End of response
```

```
REQ: DIAL_ABORT 14075551212&&WIRELESS&&POTS

402 Start of data showing status of handled request
411 End of response

RPLY: dial - hungup 14075551212 on line "POTS"
```

- *REQ: INFO <number>&&<name>*
  REQ: INFO <number>&&<name>&&<lineid>

- *This number and name have no alias, blacklist or whitelist entry...*

```
REQ: INFO 4075551212&&WIRELESS

403 Start of data defining permitted requests
INFO: alias NOALIAS "" NOALIAS ""
INFO: neither
INFO: dial 4075551212&&WIRELESS
411 End of response
```

- *Same as above, except there's also no alias for <lineid> of POTS....*

```
REQ: INFO 4075551212&&WIRELESS&&POTS

403 Start of data defining permitted requests
INFO: alias NOALIAS "" NOALIAS ""
INFO: neither
INFO: dial 4075551212&&WIRELESS
411 End of response
```

- *An example showing blacklist and white list entries and aliases based on the number and lineid. The whitelist entry takes precedence over the blacklist of the entire area code; this is why REQ: INFO doesn't report* `black number` *. For clarity, some server responses to REQ: RELOAD are not shown....*

```
REQ: RELOAD

400 Start of data requiring OK

INFO: Alias Table:
INFO: Number of Entries: 2
INFO: SLOT TYPE FROM TO DEPEND
INFO: ---- ---- ---- -- ------
INFO: 000 NAMEDEP * John on Cell "4075551212"
INFO: 001 LINEONLY POTS CELL

INFO: Blacklist Table:
INFO: Number of Entries: 1
INFO: SLOT ENTRY MATCH NAME
INFO: ---- ----- ----------
INFO: 000 "^407"
```

```
INFO: Whitelist Table:
INFO:     Number of Entries: 1
INFO:     SLOT ENTRY        MATCH NAME
INFO:     ---- -----        ----------
INFO:     000  "4075551212"

410 End of data

REQ: INFO 4075551212&&WIRELESS

403 Start of data defining permitted requests
INFO: alias NAMEDEP "4075551212'
INFO: white number "4075551212"
INFO: dial 4075551212&&WIRELESS
411 End of response

REQ: INFO 4075551212&&WIRELESS&&POTS

403 Start of data defining permitted requests
INFO: alias NAMEDEP "4075551212" lineonly "CELL"
INFO: white number "4075551212"
INFO: dial 4075551212&&WIRELESS
411 End of response
```

- *REQ: PAUSE <minutes> (new in API 1.12)*

- *Check the status of a hangup pause...*

```
REQ: PAUSE -1

402 Start of data showing status of handled request
RESP: Hangup not paused
411 End of response
```

- *Pause for 3 hours and 30 minutes...*

```
REQ: PAUSE 210

402 Start of data showing status of handled request
RESP: Pausing hangups for 3 hours 30 minutes
411 End of response
```

- *Check how much time is left before hangups resume...*

```
REQ: PAUSE -1

402 Start of data showing status of handled request
RESP: Remaining Time: 2 hours 22 minutes 22 seconds
411 End of response
```

- *Cancel the hangup pause immediately...*

```
REQ: PAUSE 0

402 Start of data showing status of handled request
RESP: Hangup enabled
411 End of response
```

- *REQ: RELOAD*

- *Force the NCID server to reload alias, blacklist and whitelist tables from their respective disk files into the server's memory:*

```
REQ: RELOAD
```

```
                400 Start of data requiring OK
                INFO: Received Signal 1: Hangup: 1
        INFO: Reloading alias, blacklist and whitelist files
               INFO: Processed alias file: ncidd.alias
                         INFO: Alias Table:
                    INFO:     Number of Entries: 6
    INFO:     SLOT TYPE     FROM        TO           DEPEND
    INFO:     ---- ----     ----        --           ------
INFO:     000  NAMEDEP  *           John on Cell "4075551212"
      INFO:     001  LINEONLY POTS        CELL
       INFO:     002  NMBRONLY 6768048218  Caleb Vinson
       INFO:     003  NAMEONLY TOLL FREE   TELEMARKETER
        INFO:     004  NMBRNAME OUT-OF-AREA UNAVAILABLE
INFO:     005  NMBRDEP  *           4075551212   "SMITH JEFF"
       INFO: Processed blacklist file: ncidd.blacklist
                     INFO: Blacklist Table:
                  INFO:     Number of Entries: 18
               INFO:     SLOT ENTRY        MATCH NAME
               INFO:     ---- -----        ----------
                        INFO:     000  "^407"
    INFO:     001  "9075551414" "Fax machine keeps calling"
     INFO:     002  "2133750923" "FCC bad list 2015-12-14"
     INFO:     003  "2133750992" "FCC bad list 2015-12-14"
     INFO:     004  "2134150180" "FCC bad list 2015-12-14"
     INFO:     005  "2134566756" "FCC bad list 2015-12-14"
     INFO:     006  "2134771084" "FCC bad list 2015-12-14"
     INFO:     007  "2134879500" "FCC bad list 2015-12-14"
     INFO:     008  "2135038127" "FCC bad list 2015-12-14"
     INFO:     009  "2139227973" "FCC bad list 2015-12-14"
     INFO:     010  "2139925914" "FCC bad list 2015-12-14"
     INFO:     011  "2139925916" "FCC bad list 2015-12-14"
     INFO:     012  "2139925922" "FCC bad list 2015-12-14"
     INFO:     013  "2142284484" "FCC bad list 2015-12-14"
     INFO:     014  "2142388242" "FCC bad list 2015-12-14"
     INFO:     015  "2142694345" "FCC bad list 2015-12-14"
     INFO:     016  "2142698811" "FCC bad list 2015-12-14"
     INFO:     017  "2142815189" "FCC bad list 2015-12-14"
        INFO: Processed whitelist file: ncidd.whitelist
                     INFO: Whitelist Table:
                  INFO:     Number of Entries: 3
               INFO:     SLOT ENTRY        MATCH NAME
               INFO:     ---- -----        ----------
                    INFO:     000  "4075551212"
       INFO:     001  "4074441992" "Walt Disney World"
                    INFO:     002  "ORLANDO, FL"
     INFO: Reloaded alias, blacklist and whitelist files
                     410 End of data
```

- *REQ: REREAD*

- *Force the server to resend the call log and OPT: lines to the client and if the call log is not empty....*

```
                        REQ: REREAD

          CIDLOG: *DATE*12012015*TIME*0028*LINE*POTS*\
             NMBR*2956237064*MESG*NONE*NAME*Minnie Wallace*
          HUPLOG: *DATE*12012015*TIME*0105*LINE*POTS*\
              NMBR*2786279268*MESG*NONE*NAME*Sophie Reyes*
                                ...
                        250 End of call log
                          OPT: hangup-1
                             OPT: ...
                     300 End of connection startup
```

- *Force the server to resend the call log and OPT: lines to the client, but if the server is not configured to send the call log....*

```
REQ: REREAD

251 Call log not sent
OPT: hangup-1
OPT: ...
300 End of connection startup
```

- Force the server to resend the call log and OPT: lines to the client, but if the call log is empty....

```
REQ: REREAD

252 Call log empty
OPT: hangup-1
OPT: ...
300 End of connection startup
```

- Force the server to resend the call log and OPT: lines to the client, but if the call log file does not exist...

```
REQ: REREAD

253 No Call log
OPT: hangup-1
OPT: ...
300 End of connection startup
```

- REQ: UPDATE

- Update the **current** call log file with the latest alias changes, store the changes temporarily and present a summary for the user to accept or reject....

```
REQ: UPDATE

cidupdate -a ncidd.alias -c cidcall.log < /dev/null 2>&1\
                         < /dev/null 2>&1
401 Start of data requiring ACCEPT or REJECT
INFO: There was 1 change to cidcall.log
                         INFO:
INFO: (NAMEDEP) Changed "John on Cell" to           \
           "John's iPhone" for 4075551212 1 time
410 End of data
```

- If no changes were found, let the user know and do not prompt to accept or reject....

```
REQ: UPDATE

cidupdate -a ncidd.alias -c cidcall.log < /dev/null 2>&1\
                         < /dev/null 2>&1
400 Start of data requiring OK
INFO: There were no changes to cidcall.log
410 End of data
```

- REQ: UPDATES

- Update **all** call log files with the latest alias changes, store the changes temporarily and present a summary for the user to accept or reject....

```
REQ: UPDATES

cidupdate -a ncidd.alias -c cidcall.log < /dev/null 2>&1\
               --multi --ignore1 < /dev/null 2>&1
401 Start of data requiring ACCEPT or REJECT
INFO: There were 2 changes to cidcall.log
INFO: There were 224 changes to cidcall.log.1
INFO: There were 14 cidcall.log.2
INFO: There were 18 cidcall.log.3
```

```
                    INFO: There were 24 cidcall.log.4
                    INFO: There were 16 cidcall.log.5
                                  INFO:
INFO: (NAMEDEP) Changed "John on Cell" to           \
                "John's iPhone" for 4075551212 298 times
                          410 End of data
```

- *If no changes were found, let the user know and do not prompt to accept or reject....*

```
                          REQ: UPDATES

cidupdate -a ncidd.alias -c cidcall.log < /dev/null 2>&1\
                           --multi < /dev/null 2>&1
                      400 Start of data requiring OK
                INFO: There were no changes to cidcall.log
                          410 End of data
```

- *WRK: ACCEPT LOG*

- *Alias changes have been applied to a temporary copy of the **current** call log file and the user has **accepted** the changes. This causes the server to replace the **current** call log file with the temporary copy. No further interaction with the user is needed.*

```
                          REQ: UPDATE

cidupdate -a ncidd.alias -c cidcall.log < /dev/null 2>&1\
                              < /dev/null 2>&1
          401 Start of data requiring ACCEPT or REJECT
               INFO: There was 1 change to cidcall.log
                              INFO:
    INFO: (NAMEDEP) Changed "John on Cell" to           \
                    "John's iPhone" for 4075551212 1 time
                          410 End of data

                       WRK: ACCEPT LOG

                    mv cidcall.log.new cidcall.log
```

- *WRK: REJECT LOG*

- *Alias changes have been applied to a temporary copy of the **current** call log file and the user has **rejected** the changes. This causes the server to remove the temporary copy of the **current** call log file. No further interaction with the user is needed.*

```
                          REQ: UPDATE

cidupdate -a ncidd.alias -c cidcall.log < /dev/null 2>&1\
                              < /dev/null 2>&1
          401 Start of data requiring ACCEPT or REJECT
               INFO: There was 1 change to cidcall.log
                              INFO:
    INFO: (NAMEDEP) Changed "John on Cell" to           \
                    "John's iPhone" for 4075551212 1 time
                          410 End of data

                       WRK: REJECT LOG

                        rm cidcall.log.new
```

- *WRK: ACCEPT LOGS*

- *Alias changes have been applied to temporary copies of **all** call log files and the user has **accepted** the changes. This causes the server to replace the existing call log files with the temporary copies. No further interaction with the user is needed.*

```
                          REQ: UPDATES

cidupdate -a ncidd.alias -c cidcall.log < /dev/null 2>&1\
```

```
                    --multi --ignore1 < /dev/null 2>&1
               401 Start of data requiring ACCEPT or REJECT
                  INFO: There were 2 changes to cidcall.log
                INFO: There were 224 changes to cidcall.log.1
                     INFO: There were 14 cidcall.log.2
                     INFO: There were 18 cidcall.log.3
                     INFO: There were 24 cidcall.log.4
                     INFO: There were 16 cidcall.log.5
                                INFO:
          INFO: (NAMEDEP) Changed "John on Cell" to           \
                    "John's iPhone" for 4075551212 298 times
                           410 End of data

                        WRK: ACCEPT LOGS

          for f in cidcall.log.*[0-9]; do mv $f.new $f; done
                    mv cidcall.log.new cidcall.log
```

- WRK: REJECT LOGS

- *Alias changes have been applied to temporary copies of **all** call log files and the user has **rejected** the changes. This causes the server to remove the temporary copies of **all** call log files. No further interaction with the user is needed.*

```
                                REQ: UPDATES

                cidupdate -a ncidd.alias -c cidcall.log < /dev/null 2>&1\
                             --multi --ignore1 < /dev/null 2>&1
                   401 Start of data requiring ACCEPT or REJECT
                      INFO: There were 2 changes to cidcall.log
                    INFO: There were 224 changes to cidcall.log.1
                         INFO: There were 14 cidcall.log.2
                         INFO: There were 18 cidcall.log.3
                         INFO: There were 24 cidcall.log.4
                         INFO: There were 16 cidcall.log.5
                                    INFO:
              INFO: (NAMEDEP) Changed "John on Cell" to           \
                        "John's iPhone" for 4075551212 298 times
                               410 End of data

                            WRK: REJECT LOGS

                             rm cidcall.log.*.new
                              rm cidcall.log.new
```

Feature Set 4: Acknowledgment Support

You might want to implement this feature set if the network connection between a client/gateway and the server suffers from reliability issues.

A client/gateway can ask the server to ACK:(nowledge) all lines sent to it. Normally only used when a smartphone is involved. Requires a Feature Set 2 server.

A client/gateway can also ask the server to respond to a periodic REQ: YO request to make sure the communication to the server is still there.

SERVER IMPLEMENTATION

If you want to implement a server to take advantage of acknowledgments:

- *implement a Feature Set 1 server*

- *implement a Feature Set 2 server if a REQ: ACK is required*

- *only send ACK: lines in response to the specific client/gateway connection that sent the REQ: ACK or REQ: YO*

Server Output Lines

- *ACK: <line to be sent>*

where <line to be sent> is an exact copy of what the server just received

An ACK: is sent under two different scenarios:

- *Whenever the server receives a REQ: ACK line and also all subsequent lines received for the duration of the connection. Requires a Feature Set 2 server.*

```
ACK: REQ: ACK
ACK: CALL: ###DATE...
ACK: NOT: <message>
ACK: CALLINFO: ###END ...
```

- *Every time the server receives a REQ: YO line.*

`ACK: REQ: YO`

GATEWAY IMPLEMENTATION

- *implement a Feature Set 2 gateway*
- *if desired, send REQ: ACK to the server to enable acknowledgment of all lines*
- *gateways are allowed to send a REQ: YO to the server for an ACK: REQ: YO response. The response indicates the server is still available. It should be sent only after at least 15 minutes of no server activity.*

Gateway-to-Server

- *REQ: ACK*

Enables the server to generate an ACK: on each subsequent line sent to the server, including the REQ: ACK request. This only needs to be sent once by the gateway's connection; it remains enabled until the gateway disconnects.

`REQ: ACK`

- *REQ: YO*

A request to the server for an ACK: to make sure communication with the server is active.

`REQ: YO`

CLIENT IMPLEMENTATION

- *implement a Feature Set 1 client*
- *implement a Feature Set 2 client if a REQ: ACK is required*
- *clients are allowed to send a REQ: YO to the server for an ACK: REQ: YO response. The response indicates the server is still available. It should be sent only after at least 15 minutes of no server activity.*

Client-to-Server

- *REQ: ACK*

Enables the server to generate an ACK: on each subsequent line sent to the server, including the REQ: ACK request. This only needs to be sent once by the client's connection; it remains enabled until the client disconnects.

`REQ: ACK`

- *REQ: YO*

A request to the server for an ACK: to make sure communication with the server is active.

`REQ: YO`

Feature Set 5: Relay Job Support (new in API 1.4)

Relay Jobs allow clients and gateways to query and control other clients and gateways. Compare this with Feature Set 3 Client Jobs where clients query and/or control only the server, e.g., adding new numbers to ***ncidd.blacklist****.*

RELAY JOB OVERVIEW

Relay Jobs were originally conceived as a way for NCIDpop to ask a user for an SMS phone number and an SMS text message to be sent using NCID Android running on a smartphone. With the NOT: line type, smartphones could already forward SMS messages to connected NCID clients -- one direction only. Relay Jobs allow NCID clients like NCIDpop to "remotely" create new SMS messages for sending via smartphones. (See Appendix E: SMS Relay Job sequence diagram.)

After the initial SMS design, the Relay Job concept was expanded to allow querying the status of certain smartphone properties (e.g., battery level) and to control the smartphone's behavior in limited ways (e.g., dial a phone number).

With the final design described below, Relay Jobs are no longer limited to querying/controlling smartphones; the Relay Job specification is now generic enough that other clients and gateways can be queried/controlled.

A Relay Job consists of three primary pieces of information:

- *a Relay Job Origin (RJO) device (or client/gateway) name*
- *a Relay Job Target (RJT) device (or client/gateway) name*
- *a command to be executed (arguments are included if required)*

RJO and RJT device names should be unique (this is not strictly enforced) and are normally configured manually by the user within the NCID client or gateway program. (Quite often the RJT name will be the same value used to populate the LINE<lineid> field pair for non-RLY: line types.) If there is no way for the user to set the device name, or it's deemed unnecessary, then the default device name is usually the output of the* ***hostname*** *program on Unix/Linux, or the Computer name under Windows. When the NCID server sends the Relay Job to all listening clients and gateways, each client/gateway compares its device name against the RJT. A special target of '@all' is allowed and, assuming the target can execute the Relay Job command, any and all appropriate targets will carry it out.*

What queries/actions are allowed is entirely up to the capability of the RJT. (For example, a wifi-only tablet would not be able to dial a phone number but its battery level could probably be queried.) For this reason, this API document can only suggest possible commands that could be used; the NCID server doesn't care what they are.

If a target is not enabled for Relay Jobs, or if it is enabled but is unable to execute the Relay Job command (e.g., the wifi-only tablet can't dial a number), then the target will simply ignore the Relay Job.

The NCID server's only role is to be the middle man and "relay" these jobs from an RJO to all listening clients and gateways.

SERVER IMPLEMENTATION

If you want to implement a server to handle Relay Jobs:

- *implement a Feature Set 1 server*
- *if a client or gateway sends a line where the first field pair is prefixed with ###, replace ### with *** and send it to all connected clients and gateways*
- *if the server is configured to send the call log, change the RLY: label to be RLYLOG:*

RELAY JOB ORIGIN (RJO) IMPLEMENTATION

An RJO is typically considered to be a client and not a gateway because clients interact with a user. However, gateways can also be RJOs.

If you want to implement a client or gateway to initiate Relay Jobs:

- *when connecting to the server, be sure the server indicates it is enabled for Feature Set 5*
- *ignore (do not display) RLY: lines where the RJO matches itself*
- *ignore (do not display) RLYLOG: lines*
- *provide a way for the user to specify the RJT, or '@all', that is to execute the Relay Job*
- *provide a way for the user to type in, or select from a list, a CMD to be sent to the target, along with any required arguments*

RJO Line Type Definition

- *RLY:*

A Relay Job sent to the server.

`RLY: <message> ###DATE*<date>*TIME*<time>*TO*<target>*FROM*<origin>*CMD*<command>*`

`RLY: <message> ###DATE*<date>*TIME*<time>*TO*<target>*FROM*<origin>*CMD*<command>*ARG1*<arg1>*`

`RLY: <message> ###DATE*<date>*TIME*<time>*TO*<target>*FROM*<origin>*CMD*<command>*ARG1*<arg1>*ARG2*<arg2>*...`

<message> is optional and depends on <command>.

The RLY: line has the following field pairs (field label and field data):

<label><data>**	*Description*
###	*start of the information part of the message being sent to the server*
*DATE*date**	*where date is mmddyyyy or ddmmyyyy, m = month, d = day, y = year*
*TIME*time**	*where time is hhmm in 24-hour format, h = hour, m = minute*
*TO*target**	*where target is a case-sensitive smartphone device identifier (normally a <lineid>) or '@all'*
*FROM*origin**	*where origin is a case-sensitive smartphone device identifier (normally a <lineid>)*
*CMD*command**	*where command is a case-sensitive command to send to a smartphone*
*ARG1*arg1**	*optional field pair where arg1 is an argument value for the above command*
*ARG2*arg2**	*optional field pair where arg2 is an argument value for the above command*
...	*...*
*ARGx*argx**	*optional field pair where argx is an argument value for the above command*

The following are some suggestions for <command>:

<command>	*<arg1>*	*Description*
BATTERY		*reply with the battery level in a NOT:*
LOCATION		*reply with the GPS location in a NOT:*
PLACECALL	*<phone number>*	*remotely dial <phone number>*
RINGTONE		*play the default ringtone to help find the smartphone, or just to annoy someone*
TEXTMSG	*<phone number>*	*send an SMS <message> to <phone number>*

RELAY JOB TARGET (RJT) IMPLEMENTATION

An RJT is typically considered to be a gateway and not a client because gateways usually do not interact with a user. However, clients can also be RJTs.

If you want to implement a client or gateway to take action on Relay Jobs:

- *provide a way for the user to specify the RJT*
- *when connecting to the server, be sure the server indicates it is enabled for Feature Set 5*
- *ignore (do not display) RLY: lines where the RJO matches itself*
- *ignore (do not display) RLYLOG: lines*
- *ignore (do not display) RLY: lines where the RJT is not '@all' and the RJT does not match itself*

- *execute the job's command and use MSG: or NOT: line types to send the result back to the server*

RJT Line Type Definition

- *RLY:*

*A Relay Job sent to all listening clients and gateways. It is the same as the RJO Line Type Definition except instead of ### before the first field pair, the server changes it to ***.*

RELAY JOB EXAMPLES

The following examples are based on a setup with four devices:

- *Windows desktop named "Winny" running NCIDpop*
- *Android wi-fi only tablet named "Tabby" running NCID Android*
- *Android smartphone named "Smarty" running NCID Android*
- *Raspberry Pi named "CrayWannaBe" running NCID server*

*CMD*BATTERY**

- *Request Tabby's battery level:*

Program	*Device*	*Entry in ncidd.log*
NCIDpop	*Winny*	*RLY: ###DATE*09052016*TIME*0111*TO*Tabby *FROM*Winny*CMD*BATTERY**
ncidd	*CrayWannaBe*	*RLY: ***DATE*09052016*TIME*0111*TO*Tabby *FROM*Winny*CMD*BATTERY**
NCID Android	*Tabby*	*NOT: Battery is 100.0% (Full) ###DATE*09052016 *TIME*0111*NAME*-*NMBR*-*LINE*Tabby*MTYPE*IN**
ncidd	*CrayWannaBe*	*NOT: Battery is 100.0% (Full) ***DATE*09052016 *TIME*0111*NAME*-*NMBR*-*LINE*Tabby*MTYPE*IN**

- *Request battery level from all NCID Android devices:*

Program	*Device*	*Entry in ncidd.log*
NCIDpop	*Winny*	*RLY: ###DATE*09052016*TIME*0111*TO*@all *FROM*Winny*CMD*BATTERY**
ncidd	*CrayWannaBe*	*RLY: ***DATE*09052016*TIME*0111*TO*@all *FROM*Winny*CMD*BATTERY**
NCID Android	*Tabby*	*NOT: Battery is 100.0% (Full) ###DATE*09052016 *TIME*0111*NAME*-*NMBR*-*LINE*Tabby*MTYPE*IN**
ncidd	*CrayWannaBe*	*NOT: Battery is 100.0% (Full) ***DATE*09052016 *TIME*0111*NAME*-*NMBR*-*LINE*Tabby*MTYPE*IN**
NCID Android	*Smarty*	*NOT: Battery is 84.0% (Discharging) ###DATE *09052016*TIME*0111*NAME*-*NMBR*-*LINE*Smarty*MTYPE*IN**
ncidd	*CrayWannaBe*	*NOT: Battery is 84.0% (Discharging) ***DATE *09052016*TIME*0111*NAME*-*NMBR*-*LINE*Smarty*MTYPE*IN**

CMD*LOCATION*

- *Request Smarty's GPS coordinates:*

Program	*Device*	*Entry in ncidd.log*
NCIDpop	*Winny*	*RLY: ###DATE*09052016*TIME*1330*TO*Smarty *FROM*Winny*CMD*LOCATION**
ncidd	*CrayWannaBe*	*RLY: ***DATE*09052016*TIME*1330*TO*Smarty *FROM*Winny*CMD*LOCATION**
NCID Android	*Smarty*	*NOT: Location is: latitude 45.57175012, longitude -122.67063299 ###DATE*09052016*TIME*1330*NAME*-*NMBR*-*LINE*Smarty*MTYPE*IN**
ncidd	*CrayWannaBe*	*NOT: Location is: latitude 45.57175012, longitude -122.67063299 ***DATE*09052016*TIME*1330*NAME*-*NMBR*-*LINE*Smarty*MTYPE*IN**

CMD*PLACECALL*

- *Remotely dial a number on Smarty:*

Program	*Device*	*Entry in ncidd.log*
NCIDpop	*Winny*	*RLY: ###DATE*09052016*TIME*1751*TO*Smarty *FROM*Winny*CMD*PLACECALL*ARG1 *4075557777**
ncidd	*CrayWannaBe*	*RLY: ***DATE*09052016*TIME*1751*TO*Smarty *FROM*Winny*CMD*PLACECALL*ARG1 *4075557777**
NCID Android	*Smarty*	*CALL: ###DATE09061751...CALLOUT...LINESmarty ...NMBR4075557777...NAMEJOHN ON CELL+++*
ncidd	*CrayWannaBe*	*OUT: *DATE*09062016*TIME*1751*LINE*Smarty *NMBR*4075557777*MESG*NONE*NAME *JOHN ON CELL**
NCID Android	*Smarty*	*CALLINFO: ###BYE...DATE09061751 ...SCALL09/06/2016 17:51:12...ECALL09/06/2016 17:58:09...CALLOUT...LINESmarty ...NMBR4075557777...NAMEJOHN ON CELL+++*
ncidd	*CrayWannaBe*	*END: *HTYPE*BYE*DATE*09062016*TIME *1751*SCALL*09/06/2016 17:51:12*ECALL *09/06/2016 17:58:09*CTYPE*OUT*LINE*Smarty *NMBR*4075557777*NAME*JOHN ON CELL**

CMD*RINGTONE*

- *Remotely play Smarty's default ringtone:*

Program	*Device*	*Entry in ncidd.log*
NCIDpop	*Winny*	*RLY: ###DATE*09052016*TIME*1241*TO*Smarty *FROM*Winny*CMD*RINGTONE**
ncidd	*CrayWannaBe*	*RLY: ***DATE*09052016*TIME*1241*TO*Smarty *FROM*Winny*CMD*RINGTONE**

CMD*TEXTMSG*

- *Use NCIDpop to remotely send an SMS from Smarty:*

Program	*Device*	*Entry in ncidd.log*
NCIDpop	*Winny*	*RLY: Are you coming over to see the surprise eclipse tonight?###DATE*09052016*TIME*2138*TO *Smarty*FROM*Winny*CMD*TEXTMSG*ARG1 *4075557777**
ncidd	*CrayWannaBe*	*RLY: Are you coming over to see the surprise eclipse tonight?***DATE*09052016*TIME*2138*TO *Smarty*FROM*Winny*CMD*TEXTMSG*ARG1 *4075557777**
NCID Android	*Smarty*	*NOT:Are you coming over to see the surprise eclipse tonight?###DATE*09062016*TIME*2138*NAME *JOHN ON CELL*NMBR*14075557777*LINE*Smarty *MTYPE*OUT**
ncidd	*CrayWannaBe*	*NOT:Are you coming over to see the surprise eclipse tonight?***DATE*09062016*TIME*2138*NAME *JOHN ON CELL*NMBR*14075557777*LINE*Smarty *MTYPE*OUT**

Sending a Text Message

The server accepts a single line text message from a client and broadcasts it to all connected clients. All messages must begin with the MSG: label.

Other programs such as netcat can be used to send a message. Telnet is not recommended. If netcat is used, please note there are different versions with different options.

This shell script example creates a 10 minute food timer. The -w1 is a one second idle timeout to wait before disconnect:

```
sleep 600; echo "MSG: Food Ready" | nc -w1 localhost 3333 > /dev/null
```

(New in API 1.5) At connect, you can send zero or more HELLO: lines prior to a MSG: line. In particular, sending a HELLO: CMD: no_log line can improve performance because it forces the server not to send the call log before processing the MSG:.

```
sleep 600; \
  echo -e "HELLO: IDENT: client food timer 1.1\nHELLO: \
CMD: no_log\nMSG: Food Ready" | nc -w1 localhost 3333 > /dev/null
```

Emulation Programs and Test Files

*The **test** directory in the NCID source contains emulation programs for the server, client, SIP gateway and modem. There are also test files for the server and a client logfile used for screenshots in the source test directory. The **README-test** file explains how to use the emulation programs and test files.*

Appendix A: Quick Reference List of all {CALLTYPE} and {MSGTYPE} line types

For development purposes, here are non-clickable, copy-and-paste friendly versions all on one line. These are the types likely to be used when creating new client output modules.

No colons:

Space delimited:
BLK CID HUP MSG MWI NOT OUT PID PUT RID WID

Comma delimited:
BLK,CID,HUP,MSG,MWI,NOT,OUT,PID,PUT,RID,WID

Comma and space delimited:
BLK, CID, HUP, MSG, MWI, NOT, OUT, PID, PUT, RID, WID

Pipe delimited:
BLK|CID|HUP|MSG|MWI|NOT|OUT|PID|PUT|RID|WID

Regex-ready, pipe delimited:
^BLK|^CID|^HUP|^MSG|^MWI|^NOT|^OUT|^PID|^PUT|^RID|^WID

With colons:

Space delimited:
BLK: CID: HUP: MSG: MWI: NOT: OUT: PID: PUT: RID: WID:

Comma delimited:
BLK:,CID:,HUP:,MSG:,MWI:,NOT:,OUT:,PID:,PUT:,RID:,WID:

Comma and space delimited:
BLK:, CID:, HUP:, MSG:, MWI:, NOT:, OUT:, PID:, PUT:, RID:, WID:

Pipe delimited:
BLK:|CID:|HUP:|MSG:|MWI:|NOT:|OUT:|PID:|PUT:|RID:|WID:

Regex-ready, pipe delimited:
^BLK:|^CID:|^HUP:|^MSG:|^MWI:|^NOT:|^OUT:|^PID:|^PUT:|^RID:|^WID:

Appendix B: Index to all line type definitions

Table column	Description
FS	Applicable Feature Set
History?	Yes if saved to call history log
Modules?	Yes if sent to client output modules
Forwarded?	Line type that is sent to forwarding gateway

Arranged alphabetically.

Click on the Line type XXX to be taken to its definition.

Not included below are XXXLOG: line types. If the History? column is Yes, then when the server sends the call history log, it replaces the XXX: label with XXXLOG:. Clients parse XXXLOG: as if they were XXX:.

Line type	FS	History?	Modules?	Forwarded?
\n (newline)	1			
200	1			
210	1			
250 - 254	1			
300	1			
400	3			
401	3			
402	3			
403	3			
410	3			
411	3			
ACK:	4			
BLK:	2	Yes	Yes	+BLK:
CALL:	2			
CALLINFO:	2			
CID:	1	Yes	Yes	+CID:
CIDINFO:	1	Yes		+CIDINFO:
END:	2	Yes		+END:
GOODBYE (client)	1			
GOODBYE (gateway)	2			
HELLO: (client)	1			
HELLO: (gateway)	2			
HUP:	1	Yes	Yes	+HUP:
INFO:	3			
LOG:	1			
MSG: (client output)	1			
MSG: (gateway alerts)	2	Yes	Yes	+MSG:
MSG: (gateway output)	2			
MSG: (server alerts)	1	Yes	Yes	+MSG:
MSG: (server output)	1	Yes	Yes	+MSG:
MWI:	2	Yes	Yes	+MWI:
NOT: (gateway)	2	Yes	Yes	+NOT:
NOT: (server)	2	Yes	Yes	+NOT:
OPT:	1			
OUT:	2	Yes	Yes	+OUT:
PID:	2	Yes	Yes	+PID:
PUT:	2	Yes	Yes	+PUT:
REQ:	3			

REQ: ACK (client)	4			
REQ: ACK (gateway)	4			
REQ: DIAL or DIAL ABORT	3			
REQ: INFO	3			
REQ: PAUSE	3			
REQ: RELOAD	3			
REQ: REREAD	3			
REQ: UPDATE	3			
REQ: UPDATES	3			
REQ: YO (client)	4			
REQ: YO (gateway)	4			
REQ: alias	3			
REQ: black	3			
REQ: white	3			
RESP:	3			
RID:	2	Yes	Yes	+RID:
RPLY:	3			
RLY: (Relay Job Origin (RJO))	5	Yes		+RLY:
RLY: (Relay Job Target (RJT))	5	Yes		+RLY:
WID:	2	Yes	Yes	+WID:
WRK:	3			
WRK: ACCEPT LOG	3			
WRK: ACCEPT LOGS	3			
WRK: REJECT LOG	3			
WRK: REJECT LOGS	3			

Appendix C: Quick Reference List of all server configuration settings

Arranged alphabetically by setting name.

File Name	Setting name	Brief description
ncidd.conf	addedmodems	a list of file names for multiple modems
ncidd.conf	announce	file name of raw modem device (.rmd) file to be played
ncidd.conf	audiofmt	"AT" command string to set voice modem audio format
ncidd.conf	blacklist	blacklist file name
ncidd.conf	cidalias	alias file name
ncidd.conf	cidinput	select Caller ID source
ncidd.conf	cidlog	log file name for call activity
ncidd.conf	cidlogmax	maximum size in bytes of cidlog
ncidd.conf	cidnoname	enable/disable detection of Caller ID name from Telco (Removed in API 1.9)(Restored in API 1.13)
ncidd.conf	country	two-letter uppercase Country Code where the server is running; used when formatting original NMBR field pair to become FNMBR (new in API 1.11)
ncidd.conf	datalog	log file name for raw data received from modems and gateways
ncidd.conf	gencid	enable/disable reporting of generic Caller ID
ncidd.conf	hangup	disable/select hangup mode
ncidd.conf	hupmode	Hangup Extension: disable/select hangup mode
ncidd.conf	hupname	Hangup Extension: file name of external script/program
ncidd.conf	huprmd	Hangup Extension: file name of raw modem device (.rmd) file to be played
ncidd.conf	ifaddr	restrict port connections
ncidd.conf	ignore1	enable/disable leading 1 in US/Canada
ncidd.conf	initcid	"AT" command string to enable modem's Caller ID
ncidd.conf	initstr	"AT" command string to initialize modem
ncidd.conf	language	two-letter lowercase Language Code where the server is running; used when populating the LOCA field pair (new in API 1.11)
ncidd.conf	lineid	phone line identifier
ncidd.conf	lockfile	full path to modem/serial device lock file
ncidd.conf	nanp_format	phone number format for NANP countries (new in API 1.11)
ncidd.conf	pickup	enable/disable sending of "AT" command string to pickup phone line
ncidd.conf	pidfile	full path to server's process id file, prevents multiple instances
ncidd.conf	port	server's listening TCP/IP port number
ncidd.conf	regex	enable/disable POSIX or Perl Compatible regular expressions for alias, blacklist and whitelist files
ncidd.conf	send cidinfo	enable/disable sending of ring info to clients
ncidd.conf	send cidlog	enable/disable sending of call log to clients
ncidd.conf	ttyclocal	enable/disable hardware flow control for modem or serial device
ncidd.conf	ttyport	modem or serial device port name
ncidd.conf	ttyspeed	modem or serial device communication speed

ncidd.conf	verbose	verbose level
ncidd.conf	whitelist	blacklist file name

Appendix D: More info about modem MESG hexadecimal characters

When a modem that is configured to output ASCII Plain Format Caller ID instead receives something in the raw SDMF parameter data or the raw MDMF parameter data that it does not understand, it will generate a MESG line of the unknown parameter block as a series of hexadecimal characters using ASCII text. This does not mean an error was detected, rather it is additional call detail provided by the telco that the modem doesn't know how to decode.

The NMBR label may be DDN_NMBR (Dialable Directory Number) instead, depending on the country.

Example of an incoming call generated by British Telecom in the UK:

```
RING
```

```
MESG = 110101
DATE = 0511
TIME = 1852
NAME = JOHN DOE
NMBR = 4075550000 or DDN_NMBR = 4075550000
```

```
RING
```

The hexadecimal characters can be interpreted by going to the British Telecom document index, accepting the copyright agreement and then selecting Suppliers' Information Notes (SIN) #227. Page 22 of 34 has the following info (field names relabeled for clarity):

Field name	Hex byte	Meaning
Parameter Code	11	Call type
Parameter Length	01	1 byte
Qualifier	01	Voice call

This indicates a normal call so the MESG line can be safely ignored.

Example of a call from Bell Canada:

```
RING
```

```
DATE = 0511
TIME = 1852
NAME = JOHN DOE
NMBR = 4075550000 or DDN_NMBR = 4075550000
MESG = 06014C
```

```
RING
```

The hexadecimal characters can be interpreted using page 15 of 21 of the Bell Interface Document (BID), BID-0001 (on the Wayback Machine):

Field name	Hex byte	Meaning
Parameter Code	06	Call type
Parameter Length	01	1 byte
Qualifier	4C ("L")	Long distance call

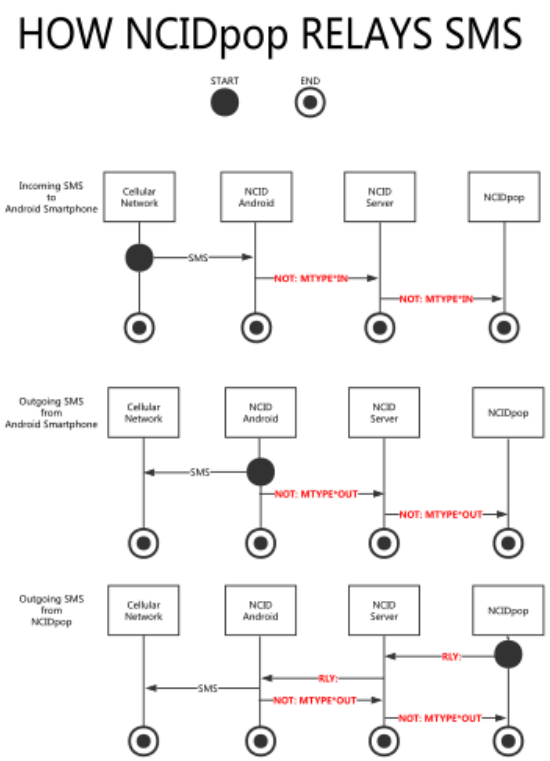
It is unclear what determines the sequence that the MESG line is emitted by the modem. For British Telecom, modems seem to generate MESG before DATE and for Bell Canada telcos, modems seem to generate it after NMBR/DDN_NMBR.

Additional info in this UK Telecom Google Group post.

Appendix E: SMS Relay Job sequence diagram (new in API 1.4)

Below is a sequence diagram showing how NCIDpop relays SMS to NCID Android.

The first two sequences show the use of NOT: only. The third sequence shows how RLY: was added to allow NCIDpop to "remotely" send SMS messages.



Appendix F: Index to all field pair definitions

Arranged alphabetically by field label.

Click on a link to be taken to its definition.

Field Label	Description
ARG**x**	RLY: CMD arguments
CARI	phone number's carrier name (new in API 1.11)
CMD	RLY: command
CTRY	phone number's two-letter uppercase country code (new in API 1.11)
CTYPE	END: type of call (used for end-of-call accounting)
DATE	date
ECALL	END: date/time the call ends (used for end-of-call accounting)
FNMBR	formatted phone number (new in API 1.11)
FROM	RLY: sending device identifier
HTYPE	END: reason the call ended (used for end-of-call accounting)
LINE	phone line identifier
LOCA	phone number's location within the country (new in API 1.11)
MESG	text message
MODE	hangup mode for server extension
MTYPE	text message type
NAME	caller's name
NMBR	phone number
NTYPE	phone number's device type (new in API 1.11)
PCALL	END: date/time the call is picked up (used for end-of-call accounting)
RING	CIDINFO: ring count and status
SCALL	END: date/time the call starts (used for end-of-call accounting)
TIME	time
TO	RLY: receiving device identifier
TYPE	line type for output modules

Appendix G: Field pair definitions

Arranged alphabetically.

ARGx

- *where **x** is an incrementing integer starting at one; there is no defined maximum*
- *used exclusively for the RLY: line type*
- *a string of characters representing a single argument for a CMD field pair sent to a device running NCID Android*
- *there can be zero or more ARGx field pairs for a single RLY: line; specify as many as needed by a CMD's field pair*

CARI (new in API 1.11)

- *a string of characters that indicates the phone number's carrier name (telco) of the Caller ID*
- *provided by the Google libphonenumber project integration*
- *can include embedded spaces (do not surround with quotes)*
- *can include punctuation marks*
- *no defined length limit*
- *if there is no carrier, it should not be left blank (although this is not strictly enforced and you may get unpredictable results), but instead should contain NONE or a dash ("-")*
- *There is an important caveat to be aware of: number portability (moving a number from one carrier to another). From the Google libphonenumber project FAQ: "Not all regions support mobile number portability. For those that don't, we return the carrier when available. For those that do, we return the original carrier for the supplied number."*

CMD

- *used exclusively for the RLY: line type*
- *a string of characters representing a single command to a device running NCID Android*
- *currently supported commands are: BATTERY, LOCATION, PLACECALL, RINGTONE, TEXTMSG*

CTRY (new in API 1.11)

- *caller's two-letter uppercase country code, or, for outbound calls, can be the country code where the NCID server is located*
- *provided by the Google libphonenumber project integration*
- *can be ZZ if the country cannot be determined from the incoming Caller ID number*
- *can be PARSING_ERROR if the Caller ID number is invalid*

CTYPE

- *used exclusively for the END: call accounting line type, it indicates the direction of the call (inbound or outbound)*
- *can be one of: IN, OUT, PID, PUT*

DATE

- *The general rule of thumb is that dates related to call data will already be passed from the telco to NCID in the correct format for the country where NCID is running -- month/day or day/month -- as provided by the modem or other device. They will in turn be stored in the call log in the same format.*

- *There are three exceptions:*
  - *If NCID does not detect a DATE field pair it will create one from the current date. Be aware that such dates will always be in the format month/day regardless of the country where NCID is running.*
  - *Sometimes the DATE will be a date and time "combo" field where the date is only four digits (mmdd or ddmm) and the time is the normal four (hhmm) digits as described in the definition for TIME. The four digit date follows the general rule of thumb above.*
  - *(New in API 1.4) The field pair contents of RLY: line types are NOT checked at all and are expected to include the DATE field pair.*

ECALL

- *used exclusively for the END: call accounting line type, it indicates the date and time for the end of a call*
- *the date will always be in the format month/day regardless of the country where NCID is running*

FNMBR (new in API 1.11)

- *the result of formatting NMBR using the Google libphonenumber project integration*
- *can be PARSING_ERROR if the Caller ID number is invalid*

FROM

- *used exclusively for the RLY: line type*
- *a string of characters to identify the sending NCID Android device (normally the same as the device's LINE)*

HTYPE

- *used exclusively for the END: call accounting line type, it indicates how the call ended: BYE means a normal hangup, CANCEL means ring-no-answer*

LINE

- *Also referred to as <lineid> in this API, it is a string of characters that identifies the thing that is submitting data to the NCID server. If the data is a call from a modem, smartphone or gateway then <lineid> normally identifies the originating telephone line. If the data is a text message, it could be a device identifier.*
- *can include embedded spaces (do not surround with quotes)*
- *usually does not have punctuation marks*
- *as a general guideline it is suggested that this be no more than six characters but this is not strictly enforced*
- *you can apply aliases to LINE data*
- *if there is no <lineid>, it should not be left blank (although this is not strictly enforced and you may get unpredictable results), but instead should contain NO-LINE or a dash ("-").*

LOCA (new in API 1.11)

- *a string of characters that indicates the location or area (state/province/region/city) within the country*
- *provided by the Google libphonenumber project integration*

MESG

This field pair is used in two different cases: 1) detecting and reporting exceptions in the SMDF/MDMF data streams from modem or modem-like devices, and 2) a simple text message to be passed from a device or gateway to connected clients.

Case 1: SDMF/MDMF exceptions from a modem or modem-like device

- *a string of hexadecimal characters that represent raw Caller ID data bytes that the modem does not understand (see Appendix D: More info about modem MESG hexadecimal characters)*
- *there may be multiple MESG lines emitted, one line for each exception*
- *used with line types assigned as {CALLTYPE} in the Categories table*
- *the field pair MTYPE is not used*
- *(Removed in API 1.8) ~~NCID does not currently interpret the MESG code in any way but simply captures it and sends it on to listening clients~~*
- *(New in API 1.8) NCID will decode the hexadecimal characters in situations where it has useful info. For example, the telco may transmit a simple status indicator as to whether there is a voicemail message waiting, or a count of the number of voicemail messages waiting.*
- *no defined length limit*
- *if there are no hexadecimal characters, it should not be left blank when populating the field pair (although this is not strictly enforced and you may get unpredictable results), but instead should contain NONE or a dash ("-")*

Case 2: A simple text message

- *a string of characters that can contain anything, including one or more embedded asterisks*
- *it is not necessary to use double quotes to surround any part of the text; double quotes are treated like any other punctuation character*
- *used with line types assigned as {MSGTYPE} in the Categories table*
- *if the data stream does not explicitly have the MESG field label, it is assumed that the message text is all of the free form text appearing after the {MSGTYPE} line type and before the first field label.*
- *the field pair MTYPE is expected*
- *no defined length limit; note that smartphone SMS text messages can be several hundred bytes in length*

MODE

- *an integer corresponding to the **ncidd.conf::hupmode** server configuration setting*
- *used internally by the NCID server and the Optional Server Hangup Extension*

MTYPE

- *a string of characters that indicates the type of data contained in the MESG field pair*
- *the server will default an empty/missing MTYPE as USER*
- *can be IN or OUT to indicate the direction relative to LINE*
- *can be SYS indicating a server generated message (e.g., modem disconnected)*
- *can be - or NONE*

NAME

- *a string of characters that indicates the caller's name from a modem, gateway or smartphone, or a name alias*
- *can include embedded spaces (do not surround with quotes)*
- *can include punctuation marks*
- *can be one of the special names OUT-OF-AREA, ANONYMOUS and PRIVATE*

- *if there is no NAME, it should not be left blank (although this is not strictly enforced and you may get unpredictable results), but instead should contain NO NAME or a dash ("-")*
- *NAME should not exceed 50 characters and in particular the NCID server enforces an alias maximum length of 50.*
- *can be UNKNOWN for smartphone SMS messages*

NMBR

- *a string of characters that indicates the phone number from a modem, gateway or smartphone, or a number alias*
- *usually does not have embedded spaces*
- *if punctuation marks are present, it is usually a dash ("-")*
- *can be one of the special names OUT-OF-AREA, ANONYMOUS and PRIVATE*
- *if there is no number, it should not be left blank (although this is not strictly enforced and you may get unpredictable results), but instead should contain NO-NUMBER or a dash ("-"). The general size limit in the telephone industry is 15 characters or less.*

NTYPE (new in API 1.11)

- *a string of characters that indicates the phone number's device type ("fixed" for a landline, mobile, pager, short public number, etc.)*
- *provided by the Google libphonenumber project integration*
- *typical values: CELL, FIX/CELL, T-FREE*

PCALL (new in API 1.13)

- *used exclusively for the END: call accounting line type, it indicates the date and time for the start of a call*
- *the date will always be in the format month/day regardless of the country where NCID is running*

RING

- *a signed integer representing the ring count or status*
- *used exclusively for the CIDINFO: line type*

SCALL

- *used exclusively for the END: call accounting line type, it indicates the date and time for the start of a call*
- *the date will always be in the format month/day regardless of the country where NCID is running*

TIME

- *Most TIME fields are expected to be in military style 24-hour format (hours 0-23). Clients have the option of converting to 12-hour AM/PM format.*
- *If NCID does not detect a TIME field pair it will create one from the current time.*
- *(New in API 1.4) The field pair contents of RLY: line types are NOT checked at all and are expected to include the TIME field pair.*
- *NCID does not care or know anything about time zones.*

TO

- *used exclusively for the RLY: line type*
- *a string of characters to identify the receiving NCID Android device (normally the same as the device's LINE)*
- *can be @all*

TYPE

- *used internally by the server when passing data to an output module*
- *a string of characters corresponding to a {CALLTYPE} or {MSGTYPE} as seen in the Categories table*
- *will not have a trailing colon*

API Version Change History

*As new features are added they are marked **(New in API ?.?)***

*As features are removed, they are marked **(Removed in API ?.?)***

The API version number is represented by ?.?

Release Summary

API Version	*NCID Version*	*Feature Sets*
1.13	*1.14*	*1 2 3 4 5*
1.12	*1.13*	*1 2 3 4 5*
1.11	*1.12*	*1 2 3 4 5*
1.10	*1.11*	*1 2 3 4 5*
1.9	**1.10*	*1 2 3 4 5*
1.8	*1.9*	*1 2 3 4 5*
1.7	*1.8*	*1 2 3 4 5*
1.6	*1.7*	*1 2 3 4 5*
1.5	*1.6*	*1 2 3 4 5*
1.4	*1.5*	*1 2 3 4 5*
1.3	*1.4*	*1 2 3 4*
1.2	*1.3*	*1 2 3 4*
1.1	*1.1*	*1 2 3 4*
1.0	*1.0*	*1 2 3 4*

**All programs in the released NCID version 1.10 incorrectly report API version 1.8. Despite this cosmetic issue, all programs do conform to API version 1.9 as indicated above.*

Version 1.13

General changes

- *Feature sets supported: 1 2 3 4 5*
- *Released simultaneously with NCID 1.14.*

Appendix C: Quick Reference List of all server configuration settings

- *Restored **ncidd.conf::cidnoname** to handle unreliable NAME data.*

Appendix F: Index to all field pair definitions

- *Added PCALL field pairs*

Appendix G: Field pair definitions

- *Added PCALL field pairs*

Before You Begin

GUIDELINES FOR CALCULATING CALL DURATION

- *Added PCALL fields and updated section*

Version 1.12

General changes

- *Feature sets supported: 1 2 3 4 5*
- *Released simultaneously with NCID 1.13.*

Feature Set 3: Client Job Support

Client Job Examples

- *Added REQ: PAUSE <minutes>*

Client-to-Server

- *Added REQ: PAUSE <minutes>*
- *updated INFO lines for alias, black and white*

Before You Begin

GUIDELINES FOR CALCULATING CALL DURATION

- *New*

Version 1.11

General changes

- *Feature sets supported: 1 2 3 4 5*
- *Released simultaneously with NCID 1.12.*

Google libphonenumber project integration

The NCID server now uses the Google libphonenumber project integration to automatically format phone numbers by country. Clients no longer need to be configured to do so.

Before you begin

ABOUT LINE TYPES AND FIELD PAIRS

- *Added field pairs to the Frequently Used table: CARI, CTRY, FNMBR, LOCA, NTYPE*

Call/Message Line Types, Categories and Structure

{CALLTYPE} CATEGORY STRUCTURE

- *Added field pairs: CARI, CTRY, FNMBR, LOCA, NTYPE*

Call/Message Line Types, Categories and Structure

{MSGTYPE} CATEGORY STRUCTURE -> Server Output Lines

- *Added field pairs: CARI, CTRY, FNMBR, LOCA, NTYPE*

Feature Set 1: Modem and Device Support

Server Implementation -> Server Output Lines

- *Added OPT: country*

Client Implementation -> Optional Client-to-Module

- *Added field pairs: CARI, CTRY, FNMBR, LOCA, NTYPE*
- *Added SYS and USER to* ***MTYPE***

Appendix C: Quick Reference List of all server configuration settings

- *Added **ncidd.conf::country**, **ncidd.conf::language** and **ncidd.conf::nanp_format** for the Google libphonenumber project integration*

Appendix F: Index to all field pair definitions

- *Added field pairs: CARI, CTRY, FNMBR, LOCA, NTYPE*

Appendix G: Field pair definitions

- *Added field pairs: CARI, CTRY, FNMBR, LOCA, NTYPE*

Version 1.10

General changes

- *Feature sets supported: 1 2 3 4 5*
- *Released simultaneously with NCID 1.11.*

Removed in API 1.11

The following reference to 254 Start of call log was inadvertently attributed as a change to API 1.10 instead of being attributed to the Documentation Change History for April 26, 2019. This effectively means API 1.10 had no code-level changes at all.

~~*#### Feature Set 1: Modem and Device Support*~~

~~*Server Implementation*~~

- ~~*Added 254 Start of call log line.*~~

Version 1.9

General changes

- *Feature sets supported: 1 2 3 4 5*
- *Released simultaneously with NCID 1.10.*

Feature Set 1: Modem and Device Support

Server Implementation

- *Changed description of hangup and when CID: line is sent.*

Server Output Lines

- *Added "-4 = (modem) automatic hangup complete" to the CIDINFO table.*

Appendix C: Quick Reference List of all server configuration settings

- *Removed **ncidd.conf::cidnoname** because it is no longer used.*

Version 1.8

General changes

- *Feature sets supported: 1 2 3 4 5*
- *Released simultaneously with NCID 1.9.*

Before you begin

ABOUT CONFIGURATION OPTIONS FOR SERVER IMPLEMENTATIONS

- *Added **XDMF Gateway settings** line to the table*

GENERAL NOTES ON NAME, NMBR, LINE AND MESG FIELD DATA

- *Updated MESG to indicate the server will now decode some of the hexadecimal characters*

Feature Set 1: Modem and Device Support

SERVER IMPLEMENTATION

Server Output Lines

- *Added "-3 = (gateway) BUSY signal for incomplete call" to the CIDINFO table.*

Feature Set 2: Gateway Support

SERVER IMPLEMENTATION

- *Added a CIDINFO: line with BUSY if the ring count is -3.*
- *Added XDMF Input.*
- *Added Holtek HT9032D operation mode.*

Version 1.7

General changes

- *Feature sets supported: 1 2 3 4 5*
- *Released simultaneously with NCID 1.8.*
- *Changes made throughout for OPT: regex and* ***ncidd.conf::regex****. These now support a dash to accommodate the new value of 2 (regex-2) for PCRE (Perl Compatible Regular Expressions). POSIX expressions were already supported but are now designated by regex-1.*

Call/Message Line Types, Categories and Structure (new in API 1.7)

- ***New***

Feature Set 1: Modem and Device Support

Server Implementation -> Modem-to-Server

- *ASCII Hex Format Caller ID (SDMF, MDMF a.k.a. XDMF).*
- *Originally named "Added new support for Unformatted Caller ID (SDMF, MDMF)" in API 1.7 it has been renamed in later versions.*
- ***New***

Feature Set 2: Gateway Support

Server Implementation -> Server Output Lines

- *MWI: added as new line type for Message Waiting Indicator.*
- *PUT: added as new line type for smartphone outgoing call.*
- *RID: added as new line type for ringback Caller ID.*

Gateway Implementation -> Gateway-to-Server

- *CALL: added PUT:, MWI:,*

Version 1.6

General changes

- *Feature sets supported: 1 2 3 4 5*

- *Released simultaneously with NCID 1.7.*

Feature Set 1: Modem and Device Support

Server Implementation

- *Added new GOODBYE line type.*

Server Implementation -> Server Output Lines -> OPT: LineIDs:

- ***New***

Server Implementation -> Server Output Lines -> RPLY:

- ***New***

Server Implementation -> Optional Server Hangup Extension

- *Hangup extensions can return a hangup reason to the server.*

Client Implementation

- *Revised recommended content for HELLO: IDENT:. Removed unnecessary verbiage stating servers can display these lines.*
- *Added new GOODBYE line type.*

Client Implementation -> Client-to-Server -> GOODBYE

- ***New***

Client Implementation -> Client-to-Server

- *Added new HELLO: CMD: send_log command.*

Client Implementation -> Optional Client-to-TiVo Display

- *(Removed in API 1.6)*

Optional Server Extensions -> Optional Server Hangup Extension

- *Added MODE field pair to data passed to Hangup Server Extension.*
- *Data returned to ncidd now includes hupmode.*

Feature Set 2: Gateway Support

Gateway Implementation -> Gateway-to-Server -> GOODBYE

- ***New***

Feature Set 3: Client Job Support

Overview of Available Client Jobs

- *Added new REQ: DIAL and REQ: DIAL_ABORT line types.*

Client Implementation

- *Added "dial" to graphical NCID client features.*

Client Implementation -> Client-to-Server -> REQ: DIAL|DIAL_ABORT

- ***New***

Client Implementation -> Client-to-Server -> Requirements For Dial-a-number Client Job

- ***New***

Client Job Examples

- *Added REQ: DIAL to overview table.*

- *Added REQ: DIAL example.*

Appendix B: Index to all line type definitions

- *Added new REQ: DIAL, REQ: DIAL_ABORT, GOODBYE and RPLY line types. Removed unnecessary syntax for REQ: INFO.*

Version 1.5

General changes

- *Feature sets supported: 1 2 3 4 5*
- *Released simultaneously with NCID 1.6.*

Feature Set 1: Modem and Device Support

Server Implementation

- *Added line type HELLO:.*

Client Implementation

- *Added definition for line type HELLO:.*

Feature Set 2: Gateway Support

Gateway Implementation

- *Added line type HELLO:.*

Client Implementation

- *Added line type HELLO:.*

Optional Client-to-Module

- *Added line type HELLO:.*

Version 1.4

General changes

- *Feature sets supported: 1 2 3 4 5*
- *Released simultaneously with NCID 1.5.*
- *Added definitions for line types +BLK, +CID, +END, +HUP, +MSG, +NOT, +OUT, +PID, +RLY, +WID and +CIDINFO. These represent line types from a Forwarding Gateway. They are otherwise the same as the same line types without the leading "+".*

Before you begin

General notes on DATE and TIME field data

- *Added note that RLY: line types will not be checked for missing DATE and TIME fields because they are expected to be present.*

Feature Set 2: Gateway Support

Forwarding Gateway (Server-to-Server) (new in API 1.4)

- ***New***

Feature Set 5: Relay Job Support

- ***New***

Appendix A: Quick Reference List of all {CALLTYPE} and {MSGTYPE} line types

- *Originally named "Quick Reference List of all call type line identifiers" in API 1.4 it has been renamed in later versions.*
- *Added RLY:.*

Appendix B: Index to all line type definitions

- *Added RLY: and RLYLOG:.*

Appendix E: SMS Relay Job sequence diagram

- ***New***

Version 1.3

General changes

- *Feature sets supported: 1 2 3 4*
- *Released simultaneously with NCID 1.4*

Feature Set 1: Modem and Device Support

Server Implementation -> Server Output Lines

- *All OPT: lines output by the server are for informational and troubleshooting purposes only. Clients can optionally make use of them by giving the user a way to display them. Otherwise, clients are not required to display them, do not need to take any action on them and can safely ignore them. See Feature Set 1 OPT: definition and Feature Set 1: Client Implementation for more information.*

Client Implementation

- *All OPT: lines output by the server are for informational and troubleshooting purposes only. Clients can optionally make use of them by giving the user a way to display them. Otherwise, clients are not required to display them, do not need to take any action on them and can safely ignore them. See Feature Set 1 OPT: definition and Feature Set 1: Client Implementation for more information.*

Feature Set 2: Gateway Support

Client Implementation

- *All OPT: lines output by the server are for informational and troubleshooting purposes only. Clients can optionally make use of them by giving the user a way to display them. Otherwise, clients are not required to display them, do not need to take any action on them and can safely ignore them. See Feature Set 1 OPT: definition and Feature Set 1: Client Implementation for more information.*

Feature Set 3: Client Job Support

Server Implementation

- *reload the blacklist and whitelist files*

```
<font color="dimgray">(Removed in API 1.3) <strike> if
the **ncidd.conf::hangup** option is being used </strike> </font>
```

Client Implementation

- *All OPT: lines output by the server are for informational and troubleshooting purposes only. Clients can optionally make use of them by giving the user a way to display them. Otherwise, clients are not required to display them, do not need to take any action on them and can safely ignore them. See Feature Set 1 OPT: definition and Feature Set 1: Client Implementation for more information.*

Graphical client description

- *(Removed in API 1.3) ~~only if the server sends OPT: hangup will the user have an option to force the server to reload the blacklist/whitelist files~~*

Version 1.2

General changes

- *Feature sets supported: 1 2 3 4*
- *Released simultaneously with NCID 1.3*

Feature Set 1: Modem and Device Support

Server Implementation -> Server Output Lines

- ***changed:***
  NONAME to NO NAME
  NONUMBER to NO-NUMBER
  NOLINE to NO-LINE

Client Implementation

- *Removed* `OPT: ignore1` *from OPT: section.*

Note: In API 1.3, `OPT: ignore1` *was re-implemented for informational and troubleshooting purposes only.*

Feature Set 2: Gateway Support

Server Implementation -> Server Output Lines

- ***changed:***
  NONAME to NO NAME
  NONUMBER to NO-NUMBER
  NOLINE to NO-LINE
  NOTYPE to -

Version 1.1

General changes

- *Feature sets supported: 1 2 3 4*
- *Released simultaneously with NCID 1.1*

Feature Set 1: Modem and Device Support

Server Implementation -> Optional TCI Device-to-Server

- ***New***

Feature Set 3: Client Job Support

Client Implementation -> Client-to-Server

Graphical client description

- *(Removed in API 1.1)* ~~*only if the server sends OPT: hangup will the user be able to edit the blacklist/whitelist entries*~~

Updated the following Client Jobs:

- *REQ: black add*
- *REQ: black remove*
- *REQ: white add*
- *REQ: white remove*

with the following:

(Removed in API 1.1) ~~*The server must have sent and the client must have received, OPT: hangup to enable this Client Job.*~~

Version 1.0

- *Feature sets supported: 1 2 3 4*

- *Released simultaneously with NCID 1.0*
- *New*

Documentation Change History

April 19, 2022

General changes

- *Updated API Version 1.11 history to include the missing fields of the END line. Created {ENDTYPE} CATAGORY STRUCTURE and moved the updated END line definition there.*

August 1, 2021

General changes

- *Minor changes to doc history dates for April 2019 and October 2018*
- *Minor cosmetic fixes for formatting (e.g., "font color" tags not properly closed)*
- *To prevent confusing markdown parsers that a link is being referenced instead of optional parameters, some "[" and "]" brackets were changed to their HTML symbol equivalents [and &rback;.*
- *Do not capitalize the word smartphone unless the surrounding text is in title case.*
- *Always use title case for "Caller ID" (e.g., not "caller ID").*
- *Added note to API Version Change History -> Release Summary that programs in the released NCID version 1.10 incorrectly report API version 1.8; it should be reporting API version 1.9.*
- *Updated API Version 1.7 history to rename "Added new support for Unformatted Caller ID (SDMF, MDMF)" to be ASCII Hex Format Caller ID (SDMF, MDMF a.k.a. XDMF) and fixed the broken link.*
- *Updated API Version 1.8 history:*
- *The server will now decode some of the MESG hexadecimal characters. This had been inadvertently omitted when API Version 1.8 was published.*
- *Removed references to Formatted and UnFormatted Caller ID. These had been inadvertently included but didn't need to be.*
- *Updated API Version 1.9 history to indicate **ncidd.conf::cidnoname** has been removed. It was inadvertently still listed as an active setting when API Version 1.9 was published.*
- *Updated API Version 1.10 history to indicate the reference to 254 Start of call log was intended to be made to the Documentation Change History for April 26, 2019 instead.*
- *{CALLTYPES} and {MSGTYPES} changed everywhere from plural to singular to match output module scripts and their configuration files.*
- *Removed the **Country Codes** section. Prior to NCID 1.12, the client only supported six country formats. Now the server supports (nearly) all country formats. Old links to the Country Codes section in this document have been replaced by a link to ISO 3166-1 alpha 2 codes.*
- *Removed reference to **Country Codes** section from Documentation Change History for May 31, 2018.*

ABOUT LINE TYPES AND FIELD PAIRS

- *Renamed "Field Pairs" to "Field Pairs - Overview"*
- *Added table: Field Pairs - Frequently Used*
- ***New***

Feature Set 1: Modem and Device Support

Server Implementation

- *Added 254 Start of call log because it was previously undocumented.*

Server Implementation -> Modem-to-Server

- *Renamed "ASCII Format Caller ID" to "ASCII Plain Format Caller ID". Link changed similarly.*
- *Changed "XDMF ASCII Hex Format Caller ID (SDMF, MDMF)" to "ASCII Hex Format Caller ID (SDMF, MDMF a.k.a. XDMF)".*

Client Implementation -> Optional Client-to-Module

- *Changed to use uppercase field pair labels to be consistent with the rest of the document.*
- *Added clickable links to go to the field pair definition.*
- *The field pair table had MESG and MTYPE inadvertently swapped; correct sequence is: line 7 for MTYPE, line 8 for MESG.*

Feature Set 2: Gateway Support

Server Implementation -> XDMF input

- *Renamed "XDMF ASCII Format Caller ID" to "ASCII Hex Format Caller ID (SDMF, MDMF a.k.a. XDMF)".*

Feature Set 3: Client Job Support

Server Implementation -> Server Output Lines

- *Changed line type range 250 - 253 to be 250 - 254.*

Client Implementation -> Client-to-Server

- *Changed line type range 250 - 253 to be 250 - 254.*

Appendix A: Quick Reference List of all {CALLTYPE} and {MSGTYPE} line types

- *Appendix A renamed (again! but slightly different!) from "Copy-and-paste friendly {CALLTYPE} and {MSGTYPE}" to "Quick Reference List of all {CALLTYPE} and {MSGTYPE} line types".*

Appendix B: Index to all line type definitions

- *Changed line type range 250 - 253 to be 250 - 254.*

Appendix D: More info about modem MESG hexadecimal characters

- *Added link to raw SDMF parameter data*
- *Renamed "ASCII Format Caller ID" to "ASCII Plain Format Caller ID".*
- *Fixed link for ASCII Plain Format Caller ID*

Appendix F: Index to all field pair definitions

- ***New***

Appendix G: Field pair definitions

- ***New***
- *In prior versions of the API, sections GENERAL NOTES ON NAME, NMBR, LINE AND MESG FIELD DATA and GENERAL NOTES ON DATE AND TIME FIELD DATA were separate. These are now combined, moved to become a new appendix and have been updated to include all field pairs not previously documented.*
- *Improved the explanation for how to handle empty <field data>, and the use of a dash to suppress showing anything. This has been moved to ABOUT LINE TYPES AND FIELD PAIRS.*
- *The description of the datetime "combo" has been moved and is now part of the DATE field pair definition.*
- *Improved the definition of the LINE field pair.*

- *Clarified the two situations where the MESG and MTYPE field pairs are used.*
- *Corrected the SMS info for NAME and MESG definitions.*

April 26, 2019

General changes

- *A small change to the HTML formatting for improved appearance.*

Feature Set 1: Modem and Device Support

Server Implementation

- *Added 254 Start of call log line because it was previously undocumented.*

October 27, 2018

Feature Set 1: Modem and Device Support

SERVER IMPLEMENTATION

- *Changed description of hangup and when CID: line is sent.*

Server Output Lines

- *Added "-4 = (modem) automatic hangup completed" to the CIDINFO table.*

Appendix C: Quick Reference List of all server configuration settings

- *Removed cidnoname from table*

August 17, 2018

Before you begin

ABOUT CONFIGURATION OPTIONS FOR SERVER IMPLEMENTATIONS

- *Added **XDMF Gateway settings** line to the table*

Feature Set 1: Modem and Device Support

SERVER IMPLEMENTATION

Server Output Lines

- *Added "-3 = (gateway) BUSY signal for incomplete call" to the CIDINFO table.*

Modem-to-server

- *Changed **Formatted Caller ID** to ASCII Format Caller ID.*
  Removed references to the Comet.
- *Changed **Unformulated Caller ID** to XDMF ASCII Format Caller ID.*

Feature Set 2: Gateway Support

SERVER IMPLEMENTATION

- *Added a CIDINFO: line with BUSY if the ring count is -3.*
- *Added XDMF Input.*
- *Added Holtek HT9032D operation mode.*

May 31, 2018

General changes

- *Wherever practical, lists of line types were changed to {CALLTYPE} or {MSGTYPE}.*
- *Redundant copies of field pair tables were removed and replaced with links to {CALLTYPE} Category Structure or {MSGTYPE} Category Structure.*
- *Renamed all call-type links to be line-type links.*
- *All +XXX: and XXXLOG: definitions were removed because it is redundant data and is not of value. They have the same definitions as XXX:.*
- *Appendix B: Index to all line type definitions doesn't need "new in API" notations.*

Before you begin

About Line Types and Field Pairs

- *Renamed "About Field Pairs and Line Types" to "About Line Types and Field Pairs".*
- *Swapped section order of "Field Pairs" and "Line Types" in order to explain XXX convention.*

Feature Set 1: Modem and Device Support

Server Implementation

- *Added **ncidd.conf::cidlogmax** to discussion about **ncidd.conf::send cidlog**.*
- *Added missing reference to Hangup Extensions.*

Server Implementation -> Server Output Lines

- *CIDINFO: Updated ring count descriptions to more accurately describe the values.*
- *HUP: Added missing reference to Hangup Extensions.*
- *LOG: Updated with a more realistic example.*
- *MSG: Added missing server alert definition.*

Server Implementation -> Modem-to-Server

- *Moved and improved wording describing when caller ID is sent by telcos in different countries.*

Client Implementation

- *Moved XXXLOG: lines to be prior to line type 250. Added missing reference to LOG:.*
- *Combined hangup and hangup-1 to the same table row.*

Feature Set 2: Gateway Support

Server Implementation -> Server Output Lines

- *END: updated to clarify that CTYPE can only be IN or OUT.*
- *PID: removed reference to output module ncid-notify.*
- *WID: cosmetic, moved "(new in API 1.1)" to end of line.*

Gateway Implementation

- *Clarified "CALL field" is "CALL<type> field".*
- *Simplified and shortened text explaining CALL: text line format.*
- *Fixed typo, NOT: uses MTYPE and not TYPE.*

Gateway Implementation -> Gateway-to-Server

- *CALL: clarified use of CALLtype when using IN, CID and PID.*
- *CALLINFO: clarified use of CALLtype when using IN, CID and PID.*
- *MSG: added missing gateway alert definition.*

Gateway Implementation -> Gateway-to-Server

- *CALLINFO: changed 'CALL<type>' to 'CALL<io>'. CALLio can only be IN or OUT.*
- *MSG: added missing gateway output definition.*

Client Implementation

- *Consolidated individual LOG: lines to XXXLOG:.*

Feature Set 3: Client Job Support

Client Implementation

- *Fixed link for 555-01XX fictional numbers.*

Feature Set 4: Acknowledgment Support

- *Clarified that this Feature Set applies to gateways as well as clients. Removed some repetitive explanations. Sorted request lines alphabetically within sections. Improved overall wording for clarity.*

Server Implementation -> Server Output Lines

- *Fixed example by changing PID: to CALL:.*

Gateway Implementation -> Gateway-to-Server

- *Added missing definitions for REQ: ACK depending on whether it's for a gateway or client implementation.*

Appendix A: Copy-and-paste friendly {CALLTYPE} and {MSGTYPE}

- *Appendix A renamed from "Quick Reference List of all call type line identifiers" to "Copy-and-paste friendly {CALLTYPE} and {MSGTYPE}". Removed types not likely to be used. Added MWI, PUT and RID.*

Appendix B: Index to all line type definitions

- *Appendex B Converted to a table and added all new columns.*

Appendix D: More info about modem MESG hexadecimal characters

- *Modem 'MESG' data string is MDMF. Fixed broken links to external documents.*

November 5, 2017

General changes

- *There were several places where features or line types were listed under Feature Set 1 when they should have been listed under Feature Set 2 or 3. In particular, verbiage related to gateways in Feature Set 1 was moved to, or duplicated, to their rightful place in Feature Set 2. Links updated.*
- *"Smart phone" was changed to "smartphone".*
- *Changed API Version Change History and Documentation Change History sections to use fewer font sizes. This improves readability.*
- *Some colons were missing in ACK: and REQ: line references.*
- *Added new INFO: dial line to all Client Job examples.*

- *Added new OPT: LineIDs: to examples where appropriate.*

Before you begin

About End-of-line Terminators

- ***New***

Ensuring connectivity with the server

- *Clarified that the three methods to test connectivity are listed in order of increasing robustness.*
- *REQ: YO is supported in Feature Set 4 not Feature Set 2.*

Feature Set 1: Modem and Device Support

Server Implementation -> Server Output Lines

- *Call/line types now in alphabetical order, e.g., CIDINFO: now before CIDLOG:.*
- *MSG: server definition: removed incorrect reference to "user generated message".*
- *OPT: definition:*

Clarified that unless otherwise noted, all OPT: lines should be ignored. It is an exception if a client needs to use them.

Expanded descriptions of existing OPT: lines.

Server Hangup Support

Alphabetical list of related server configuration options:

- *Added cidinput, removed nomodem and noserial.*

Server Implementation -> Optional Server Hangup Extension

- *Clarified that other lines to STDOUT will be logged in ncidd.log.*

Client Implementation

- *Improved wording regarding xxxLOG: lines. Added MSGLOG:.*
- *Clarified that unless otherwise noted, all OPT: lines should be ignored. It is an exception if a client needs to use them.*

Client Implementation -> Client-to-Server

- *Moved HELLO: definition from Client Implementation overview to Client-to-Server section.*
- *Slight rewording of HELLO: CMD: no_log to improve reading flow for new HELLO: CMD: send_log command.*
- *MSG: client definition: added example.*

Feature Set 2: Gateway Support

Server Implementation -> Server Output Lines

- *Renamed "Server-to-Gateway" to "Server Output Lines" because the lines will be received by clients as well as gateways.*
- *Call/line types now in alphabetical order, e.g., CIDINFO: now before END:.*

Client Implementation

- *Removed MSG: and MSGLOG: because they belong in Feature Set 1.*
- *Clarified that unless otherwise noted, all OPT: lines should be ignored. It is an exception if a client needs to use them.*
- *Added missing MSGLOG:*
- *Removed reference to Client Jobs as it is for Feature Set 3.*

- *xxxLOG: list now in alphabetical order.*

Feature Set 3: Client Job Support

Overview of Available Client Jobs

- *The table briefly describing each Client Job command had been duplicated in the Overview of Available Client Jobs and Client Job Examples sections. The Overview now has a link to the table instead.*

Server Implementation

- *Removed summary of REQ: and WRK: requests. These are adequately documented elsewhere.*

Server Implementation -> Server Output Lines

- *Made description more generic by removing reference to* ***ncidutil****.*

Server Implementation -> Server Output Lines -> 402

- *Made description more generic by removing reference to* ***ncidutil****.*

Server Implementation -> Server Output Lines -> INFO:

- *Added text label "Format 1" and "Format 2". Added 401 and 410 to Format 1. Removed duplicated Format 2 INFO: lines that are already listed under REQ: INFO.*
- *A third INFO: line has been added to indicate whether the server has been enabled to dial numbers with a locally attached modem.*

Server Implementation -> Server Output Lines -> RESP:

- *Made description more generic by removing reference to* ***ncidutil****.*

Client Implementation

- *Clarified that unless otherwise noted, all OPT: lines should be ignored. It is an exception if a client needs to use them.*

Client Implementation -> Client-to-Server -> REQ: INFO]

- *Clarified which fields must have an exact match.*
- *A third INFO: line has been added to indicate whether the server has been enabled to dial numbers with a locally attached modem.*

Client Job Examples

- *Clarified difference beween client and server links. Added server response code to server links.*

Feature Set 4: Acknowledgment Support

- *Changed YO to be REQ: YO.*

Gateway Implementation -> Gateway-to-Server

- *Line types now in alphabetical order, e.g., REQ: ACK now before REQ: ACK.*

Appendix A: Quick Reference List of all call type line identifiers

- *Call types beginning with '+' now have their own section in Feature Set 2.*

Appendix B: Index to all line type definitions

- *Call types beginning with '+' now have their own section in Feature Set 2.*
- *Split out the HELLO: line types based on feature set.*
- *Added +MSG link for forwarding gateway.*

Appendix C: Quick Reference List of all server configuration settings

- *Added cidinput, removed nomodem and noserial.*

November 6, 2016

Sending a Text Message

- *Added HELLO: lines.*

Appendix B: Index to all line type definitions

- *Added line type HELLO:.*

September 30, 2016

General changes

- *Changed fs3-job-support links to fs3-client-job support to distinguish them from the new fs5-relay-job-support links.*
- *Changed all references to the MESG*<msg>* field pair to be MESG*<hexchars>*.*
- *In all field pair tables, added "being sent to the server" to the description for ### and "being sent from the server" to the description for ***.*

Before you begin

About configuration options for server implementations

- *Expanded list of configuration files.*
- *Changed example of **ncidd.conf::cidlias** to be the less confusing example of **ncidd.conf::lockfile**.*

About line types and field pairs

- *Change description and examples in Field Pairs section to explain that the prefix for a first field pair is either ### to indicate the line is being sent to the server, or *** to indicate it is being sent from the server.*

General notes on NAME, NMBR, LINE and MESG field data

- *Expanded description for MESG field data.*

Feature Set 1: Modem and Device Support

Modem-to-Server

- *Clarified descriptions of MESG and DDN_NMBR; changed NAME in example to be JOHN DOE.*

Optional Server Hangup Extension

- *Improved description of how Hangup Extension scripts work.*

Appendix D: More info about modem MESG hexadecimal characters

- ***New***

July 23, 2016

General changes

- *None.*

Feature Set 1: Modem and Device Support

Server Implementation

Optional Server Hangup Extension

- ***New***

May 7, 2016

General changes

- *Updates for API 1.3.*
- *API Version Change History -> Release Summary*
- ***New***
- *Several sections in API 1.2 were incorrectly marked "(new in API 1.2)" when in fact these were documentation changes only and not functional changes. These have been corrected.*
- *References to specific **ncidd.conf** setting names were changed to the convention **<configuration file name::setting name>** throughout the document.*
- *Formatting changes throughout to make rendering more compatible with the Haroopad markdown editor.*
- *References to hangup logic changed as appropriate to be "Internal Hangups" or "Hangup Extensions" to accommodate new Hangup Extensions.*
- *When Internal Hangups are enabled, OPT: hangup lines will now have the format OPT: hangup-X where "X" is the hangup mode in the range 1-3. Log file examples were changed throughout from OPT: hangup to OPT: hangup-1.*
- *When Hangup Extensions are enabled, the server will send OPT: hupmode-X lines where "X" is the hangup mode in the range 1-3.*
- *Added "Released simultaneously with NCID..." to API Version history 1.0 to 1.3.*
- *Added text "Appendix A:" in front of "Quick Reference List of all call type line identifiers".*
- *Added text "Appendix B:" in front of "Index to all line type definitions".*

Before you begin

About configuration options for server implementations

- ***New***

Feature Set 1: Modem and Device Support

Server Implementation

Optional Server Extensions

- ***New***

Optional Server Hangup Extension

- ***New***

Server Implementation -> Server Output Lines

- *Clarified what "hangup" means for CIDINFO: lines.*
- *Expanded description for OPT: .*

Feature Set 2: Gateway Support

Gateway Implementation

- *Clarified what "hangup" means for CALL: lines.*

Feature Set 3: Client Job Support

Client Implementation

- *Improved wording on features that will probably be needed for a GUI client.*

API Version 1.2 History

Feature Set 3: Client Job Support -> Client Implementation

- *Removed the OPT: hangup requirement from the client section but not the server section.*

Feature Set 3: Client Job Support -> Client-to-Server

- *The reference to OPT: hangup added in API Version 1.1 was removed.*

API Version 1.1 History

Feature Set 3: Client Job Support -> Client Job Output Lines

- *Added these lines to indicate OPT: hangup from the server was not required to edit the blacklist and whitelist files:*

  (Removed in API 1.1)
  The following require receiving OPT: hangup from the server:

- *Did not remove the OPT: hangup requirement from the server and client implementation sections.*

Appendix C: Quick Reference List of all server configuration settings

- ***New***

December 29, 2015

General changes

- *Updates for API 1.2.*
- *NCID-API converted from OpenDocument Text (.odt) to Markdown (.md).*
- *Reworked formatting for all tables for better readability.*
- *All ambiguous references to line or label were changed to lineid.*
- *Where appropriate, tables defining <field label><field data> pairs for NAME, NMBR, LINE and MESG were changed to have a clickable link to the new General notes on NAME, NMBR, LINE and MESG field data section.*
- *Similarly, where appropriate, tables defining <field label><field data> pairs for DATE and TIME were changed to have a clickable link to the new General notes on DATE and TIME field data section.*
- *Section headings were renamed to more clearly indicate their content.*

Examples:

Old	*New*
Modem input to the server	*Modem-to-Server*
Gateway Output Lines	*Gateway-to-Server*

Before you begin

About field pairs and line types

- ***New***

General notes on NAME, NMBR, LINE and MESG field data

- ***New***

General notes on DATE and TIME field data

- ***New***

Ensuring connectivity with the server

- ***New***

Companion documents

- ***New***

Feature Set 1: Modem and Device Support

Server Implementation

- *Added \n (newline) section.*

Server Implementation -> Server Output Lines

- *Clarified that OPT: options are always lowercase unless otherwise indicated.*

Server Implementation -> Server Alias Support

- ***New***

Server Implementation -> Server Hangup Support

- ***New***

Client Implementation -> Client-to-Server

- *Added \n (newline) section.*

Optional Client-to-Module

- *Added standard input line 8 to have message type.*

Feature Set 3: Client Job Support

Feature Set 3 has been significantly enhanced with new content.

Overview of Available Client Jobs

- ***New***

Client Implementation -> Client-to-Server

- *Added: Modifying an alias and specifying a new alias of nothing (null) is the same as removing an existing alias.*
- *Added: REQ: alias remove syntax*

Server Implementation

- *Fixed typo in INFO: alias section - NMBDEP was changed to NMBRDEP.*

Server Implementation -> Server Output Lines

- *400: section was clarified by adding the sentence: "Nothing is sent back to the server."*
- *Added NOALIAS to INFO: section.*

Client Job Examples

- ***New***

Appendix A: Quick Reference List of all call type line identifiers

- ***New***

Appendix B: Index to all line type definitions

- ***New***