

Cognitum documentation PLOT

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Change Log:

- Mon Jul 26 2004 Ogourtsov Roman <roman@mcdi.com>
 - New RC2 release officially changes name to Cognitum. All DOCS update.
 - A short explanation of term Cognitum was added.
- Wed Jul 7 2004 Ogourtsov Roman <roman@mcdi.com>
 - Started Change Log page, please comply to general entries rules when submitting.
 - Took care of some suggestions by YM 07.04.04, added spaces around all images, few grammatical mistakes, an example is provided on setting up Entries.

TODO: Update Event state diagram

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Cognitum explained

Cognitum is a complete off-shelf Linux solution that you can install onto your computer. Currently Cognitum is based on Fedora Core2 Linux distribution. Along with a thin Linux system you will get some packages that will enable you to receive and route alarm traffic. Cognitum was intended to be a flexible and scalable trampoline type of system, that would accept alarm signals (further called **events**) from a number of possibly different inputs (further called **entries**) such as Exprecium cards or Decrypta and retransmit events to any number of predefined outputs (further called **destinations**) such as serial lines, printer, TCP.

Aimed functionality

Currently Cognitum is able to read off events from any conventional alarm receiver that can output in MLR2/MLR2000 format connected to a serial line at conventional 1200 baud / 8 bit / no parity. Only Exprecium I/II cards are supported internally. It can retransmit events to a serial port, LPT port (printing), TCP destinations (using MCDI format, see appendix), screen destinations (for manual monitoring).

Upon receiving a signal, an event is created and saved on the hard disk and then it is acknowledged off the corresponding entry. Cognitum can store up to 65,535 events on hard disk and an undefined number of events can be stored in RAM (limited by the RAM size).

Cognitum system was broken down into a few independent blocks. Failure of one block should not directly cause a failure of other blocks. Complete system is composed of: Linux kernel drivers, DM core, screen destination monitoring program, inbound traffic viewer, outbound traffic viewer, remote setup/statistic tool, **user management system**, **log file viewer**.

System requirements

Pentium III system

128+ MB RAM

2GB+ Hard drive

CDROM

PCI Ethernet card

PCI/AGP Video card

Mouse

Keyboard

To provide continuous and reliable network connectivity it is recommended to use special network routers that will automatically switch from one Internet provider to another if the connection goes down. It is also a good idea to use encrypted VPN tunnels when interconnecting remote installations. There is a number of network routers on the market that could fit the above requirements and recommendations. Although MCDI Inc. will provide you with general guidelines and advices on network layouts, we will not be able

to provide support for any possible network router on the market.

Installation notes

This instructions are intended to guide you through the installation process. It will not explain all the concepts and options that you could set during the installation nor it will not talk about all the installation screens. When installing the distribution, Anaconda installer will provide you with adequate and explanatory notes on the current installation step. You can change or adjust most of the options after the installation process, read Post installation notes for more info.

Disk Partitioning Setup:

If you are new to Linux and don't know much about partitioning it is highly recommended to use an entire hard drive for your installation and safely choose *Automatic partition* option. If you don't want to use the whole disk for Linux and if you are fairly comfortable partitioning hard drives by hand, choose *Manually partition with Disk Druid*.

Boot Loader Configuration:

If you want to build a dedicated Linux machine to receive alarm signals and don't want to be able to boot any other operating system it is safe to just click *Next* on this screen. On the other hand, if you have some other OS installed and want to be able to boot it, click *Add* and specify the partition where your OS resides along with some descriptive label.

Network Configuration:

On the top of the screen you will be able to see all automatically detected Ethernet adapters attached to your computer. To set up your network select an Ethernet card to use and click *Edit*, then if your network supports DHCP discovery select *Configure using DHCP* else specify your IP address along with a net mask. When specifying an IP address manually you will also be able to specify a Gateway address with DNS servers. Please contact your network administrator if unsure of your network setup.

Firewall configuration:

Note that for service support MCDI Inc. needs to access your installation using SSH protocol. If you do setup some firewall policies please make sure that you allow access to your SSH server. If you are unsure or not familiar enough with firewall setup please skip this step by selecting *No firewall* option and clicking *Next*.

Set Root Password:

Please write down your root password. You might be prompted for it before any technical support is done.

Package Group Selection:

Here you must select packages to be installed. Please make sure to select at least the following groups: *Administration Tools*, *System Tools* and *MCDI Inc*.

First boot notes

During your first boot, your newly installed system will prompt you for some additional settings. Firstly it will ask you to Agree upon a Fedora License Agreement. Then you will be presented with a dialog to set up current date and time, if your system is connected to the network you can use Network Time Protocol to synchronize your system clock with high precision. Display dialog will let you set your monitor's resolution and color depth, 1024x768 is recommended. User account screen will add additional users to your system. Please create at least one additional user account, since using root account for your everyday work is really a bad idea. Additional CD prompt allows you to install some additional software from other sources, please skip this step by pressing *Next*.

Post installation notes

Use the system account that you have created during First Boot setup process to login. Whenever you will need administrator access privileges for a task, system will prompt you for your root password. To tweak your system setup, go to the *System Settings* from the main menu. All the Cognitum applications can be started from *MCDI* sub-menu. For instance *MCDI/DM Configuration* will launch Cognitum DM core configuration tool as described below.

License/Support

Registration

DM core structure

The heart of Cognitum system is DM core package. In this section, the structure of DM core is outlined and explained. DM core is mainly based on three abstractions: Receiver, Entries and Destinations.

Receiver

Receiver is the whole DM core. Receiver is composed of a number of possibly different entries and destinations. All the settings specified for a receiver are globally applied to all of its entries and destinations. *Example:* if **send heart beat** option is disabled at the receiver level, no heart beat will be sent to any of destinations, although some of them could have **send heart beat** option enabled. Usually receivers have following configuration fields available:

- Name of the receiver

Description: a string that will identify your receiver, mainly used for cross reference.

- Send year

- Description:** do you want the year to be included in your output string?
- Send time
 - Description:** do you want the time at which event was received in the output string?
- Send heartbeat
 - Description:** do you want to send heartbeat from this receiver?
- Delay
 - Description:** how many microseconds to wait between packets?
- Format
 - Description:** in which format you want your output?
- TCP server
 - Description:** do you want to receive inbound traffic by TCP?
- Cards configuration (used with MCDI Inc. products only)
 - Description:** setup optimal Exprecium I/II settings for your central.

Entries

Entries are the entry points of events. Entry could be a serial alarm receiver connected to some serial port, it could be an inbound TCP connection or a hard disk when restoring saved events. All the entries have the following options:

- Name
 - Description:** a string that will identify this entry
- Type (the type of the entry)
 - Internal Exprecium (No additional configuration fields available)
 - External Exprecium
 - Port
 - Description:** to which port is Exprecium connected?
 - External TLR Plus
 - Port
 - USB Decrypta (No additional configuration fields available)

Destinations

Destinations is where your events will be send. There are 3 main kinds of destinations: **main**, **alternate** and **backup**. Destinations of all 3 kinds have the following configuration fields available:

- Name

- Send heartbeat

Description: do you want to send heartbeat on this destination?

- Type
 - Screen (No additional configuration fields available)
 - Serial
 - Port
 - Printer
 - Port
 - TCP
 - Address

Description: IP or a resolvable host name of a receiver, you want your traffic to be sent to.

- Login

Description: login you want to use on this destination

- Password

Description: a password to use along the specified login

Main destinations

Events sent so main destinations must be acknowledged. If no acknowledge is received for the event, DM core will go into the **panic state** and all the events scheduled for failed destination will be redirected to defined backup destinations. When a main destination restores (acknowledges the signal), depending on **start bottom** option, DM core either retransmits all the events sent to backup destination on the main one, or starts from the last event sent to backup destination. In latter case, event is either sent to main destination or to backup one. **Must provide a diagram here.**

Alternate destinations

Events sent to alternate kind of destinations don't need to be acknowledged. This kind of destination must be used if you want to define somewhat optional outputs. A good example of this would be a debug destination on which you may want to monitor your traffic from time to time.

Backup destinations

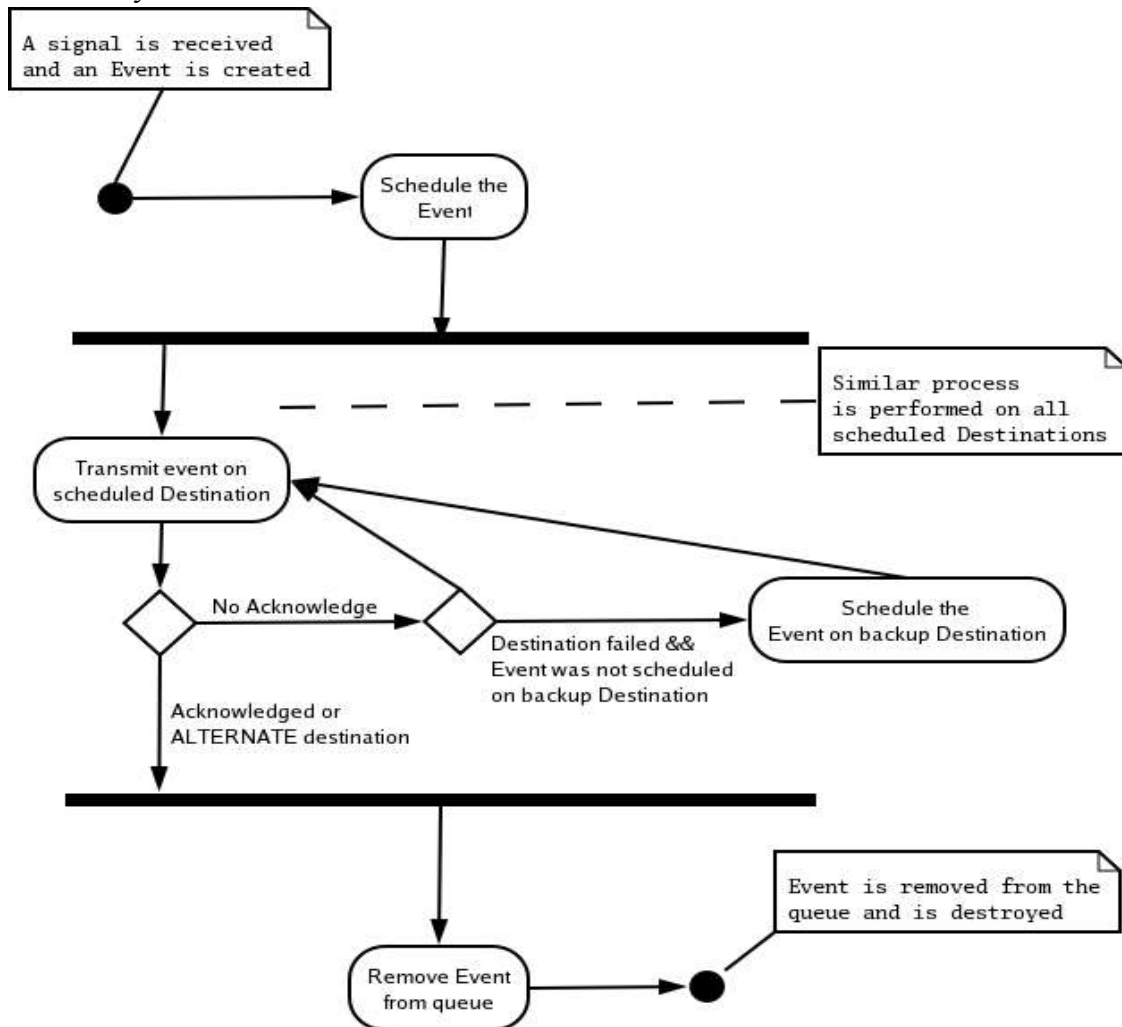
User can define backup destinations for main ones. When a main destination stops acknowledging, events are redirected to corresponding backup destinations. Events must be acknowledged on backup destinations.

DM core Functionality

This section will discuss DM core internal functionality. It will explore a few possible scenarios and will demonstrate a typical lifespan of an event.

Lifeline of an event

The following schema describes well a life of an event. First, a signal is received from a card and an event is created. Then the event is scheduled to be sent to a number of different destinations. Sending of the event on different destinations is done in parallel (it is sent at the same time). If the event is not acknowledged on some destinations it is scheduled to the backup destination. No event is ever removed from memory until it is successfully sent to all the destination to which it was scheduled.



Cognitum Remote GUI Overview

Cognitum GUI was designed to setup either local receiver (running on the same computer

as GUI) or remote receiver across a network (LAN or Internet). When started up and connected, GUI fetches all the configuration from DM core and lets you change in. Your settings will not be applied to the core at the same time you change it To save and apply your changes you must select *Apply Changes* from *Config* menu.

Cognitum Remote GUI Structure

Upon GUI startup a login manager window opens, allowing you to chose a computer to which you want to connect. After selecting an intended machine and clicking *Login*, GUI will attempt to log onto the selected receiver with a given password. If login was successful, the main menu will appear allowing you to proceed further.

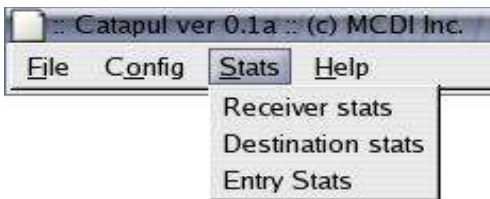
Main menu



This is how normally a main menu looks. You can access all the configuration tasks from the *Config* menu item. All the

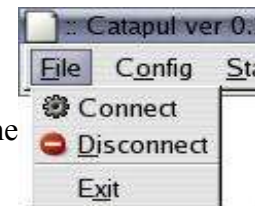
real-time statistic monitors can be accessed from the *Stat* menu. All the other functions such as *Quit* and *Disconnect* are encapsulated into the *File* menu item. Following screen shots are sub-menus drop downs, presented here merely for reference.

Select *Receiver* sub-menu to open a screen for receiver setups and options. *Inputs* will open a screen for entries configuration. *Outputs* must be used to access destination presets an settings. *Splitting* will allow you to split the output of the receiver by card number (you can force receiver not to send events from particular card to particular destination). At last *Apply Changes* must be selected in order for GUI to save all the changes into a file and apply those changes to the DM core.



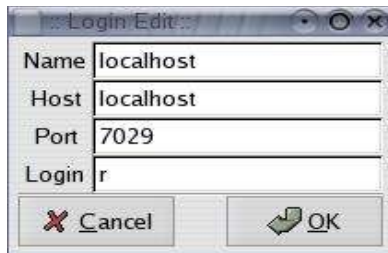
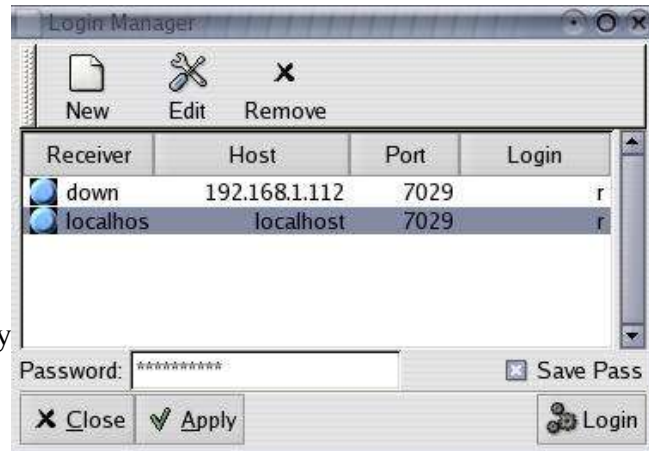
Stats menu contains *Receiver stats*, *Destination stats* and *Entry stats* sub-menus. Selecting one of them will open up a live-updated stat window presenting statistical (limited) information about the functionality and event grinding of the core.

From the *File* menu you can try to connect to another receiver by choosing *Connect* item. *Connect* will open up a login manager window, allowing you to select another receiver to connect to. Note that until you successfully connect to some other receiver your previous connection will not be closed. On the other hand, *Disconnect* will explicitly disconnect you from currently connected receiver and then will open up login manager window. To disconnect and exit from the program choose *Exit*.



Login manager

Main login manager window consists of a button task bar, of a list of saved receiver configurations to choose from, and of some controls at the bottom of the window. To connect, you should choose a receiver from the list by clicking on it. Then if the *Save Pass* check button is not selected, you should type in the password and finally click on *Login* button. You can close login manager by clicking on *Close* button. If you have changed the configuration and want to save those changes, you must click *Apply*. To remove a receiver from the list click onto *Remove* button. To edit a receiver configuration choose *Edit*.



The receiver edit window will pop-up, allowing you to change its settings. *Name* field is used only for labeling receivers. *Host* field specifies either an IP address of the receiver or a resolvable host name. Note that to access local receivers you can either specify *localhost* in the *Host* field or *127.0.0.1* IP address. *Port* field specifies a TCP port that will be used when connecting to the DM core, usually you must leave it to *7029* default value.

Login field is a login name you want to use when authenticating with DM core.

When choosing *New* from login manager main window, a similar to login edit window will pop-up, allowing you to properly specify a new receiver.

Setup screens

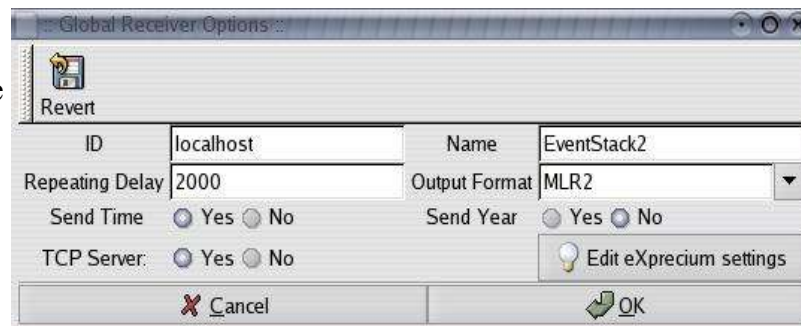
Setup screen will allow you to change DM core settings and define behavior of entries and destinations.

Receiver configuration

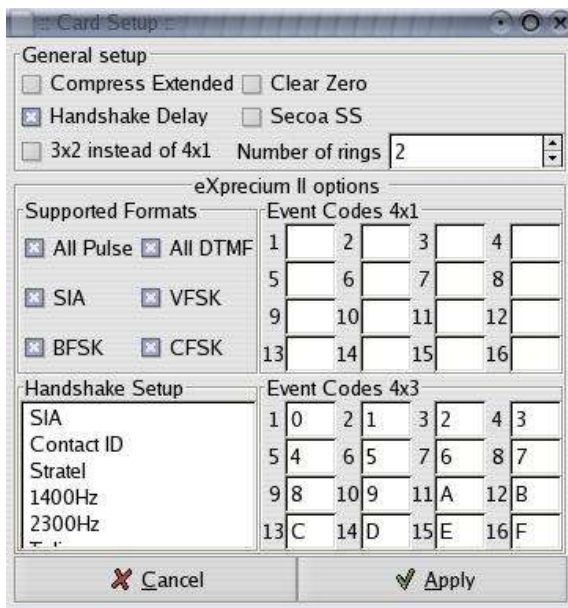
Receiver configuration will allow you to change configurations fields of the receiver briefly discussed in the

DM core structure

ID field shows the identification of this receiver as from the login manager window. *Name* specifies a string for identification and cross reference of the receiver. *Repeating Delay* denotes a



number of microseconds receiver will wait for acknowledge before trying to resend an event. In *Output Format* drop down you can chose the format you want your receiver to output in (MLR2/MLR2000 available). *Send time* and *Send year* radio buttons control whether the receiver will send time and/or year as part of its output string. *TCP server* will enable or disable TCP server to receive TCP traffic. If receiver you are configuring is set up as a TCP destination of another receiver you should enable *TCP server* option. *Edit eXprecium settings* pops up a dialog where you can specify optimal Exprecium settings for your central station. *Revert* button will undo all the changes you performed, reverting back to the original configuration. *Cancel* will close the window without saving, *OK* will save the changes.



This dialog lets you change the Exprecium options for cards that you use. After setting optimal settings for the cards, you must press Apply. Pressing Cancel will close the dialog without saving the settings.

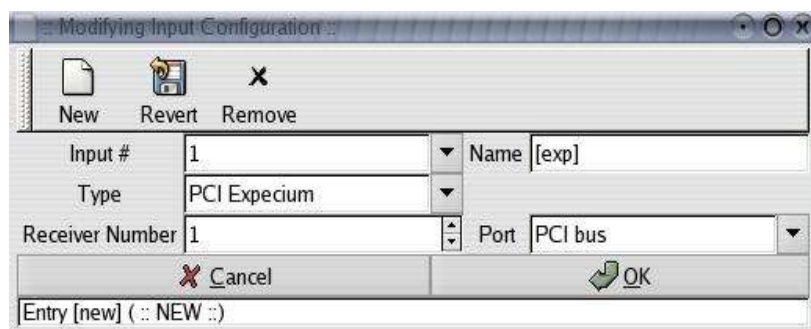
In *Handshake Setup* frame you can use drag and drop to change the handshake sequence.

Someone please help me with those options. Or lets just copy/paste from the Exprecium manual?

Entries configuration

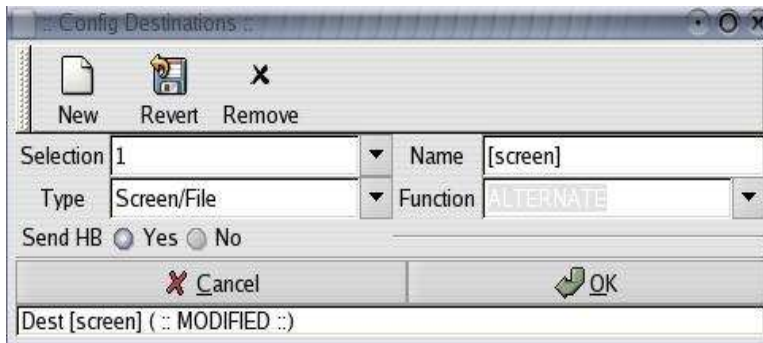
Before editing an input you must select its corresponding number from the *Input #* drop down. *Name* field specifies a string that will represent this input when cross referencing. *Type* drop down specifies the type of the input (as was

briefly discussed in **DM core structure** section). *Receiver number* denotes the receiver number that will be prefixed to all events coming from this input. *Port* specifies the port



DM core must use to open the entry. *Port* drop down items changes as you change the *Type*, since different kinds of ports are used to access different types of entries. *New* will create a new input allowing you to change all changeable settings. *Remove* will remove currently selected entry. *Revert* will undo all the changes to the currently selected input. You can see the status of the selected entry at the bottom of the form. Clicking *Cancel* will discard all the changes and will close window. *OK* on the other hand will save changes and close the window. For example to read events off an externally connected Decrypta: add a new entry by pressing *New*, specify entry name in the *Name* field, choose *Decrypta* from the *Type* drop down and specify a serial port to which Decrypta is connected from *Port* dropdown and press *OK*. Note that you will have to *Apply Changes* from the *Config* menu in order to save changes.

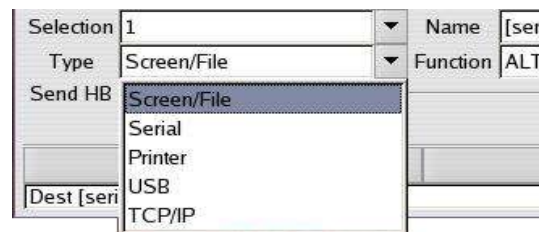
Destinations configuration



Just as in input configuration, first you must select a destination you want to edit. In *Selection* drop down select the number of desired destination. *Name* field as usual shows identification string used for cross referencing. *Type* drop

down specifies the type of the destination. *Function* drop down specifies a kind of destination as outlined in **DM core structure** section. *Send HB* controls whether or not DM core will output heartbeat signal on this destination. Selecting *New* will create a new destination, allowing you to change its settings. *Remove* removes currently selected destination. *Revert* undoes all the changes performed on the destination, reverting back to its original settings. Status of currently selected destination can be seen at the bottom of the form.

Depending on the selection of *Type* drop down some other pertinent options of destination become visible. For instance *TCP/IP* type will make *Host*, *Login* and *Password* input fields available. So you could specify an IP address and a login name to use when connecting on that destination. *Serial* or *Printer* destination



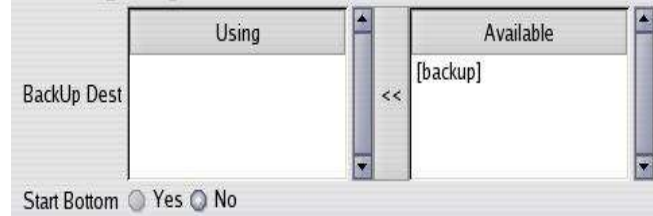
Send HB Yes No

Port Number

will make *Port* input box visible.

Making a destination main, by selecting *MAIN* from the *Function* drop down will make *Backup destination selection* visible. Now by selecting backup destination in *Available* list and adding them to *Using* list, you can specify backup destinations for a currently selected main destination. *Start Bottom* specifies if on restore you want to skip sending events that have been already sent to backup destination. In other words, if a main

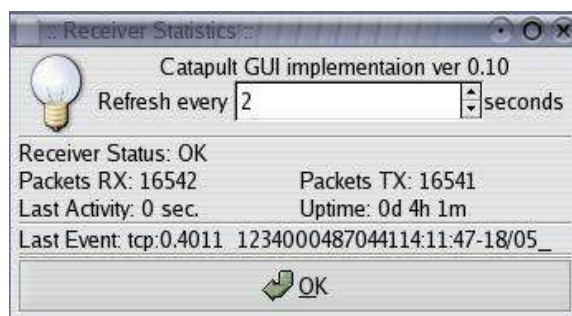
destination failed and some events were successfully transmitted to specified backup destinations, do you want to skip repeating those events on main destination when receiver restores?



Stats

Live updating stats are available. It can be used to monitor overall DM core operation or to debug receiver operation.

Receiver stats

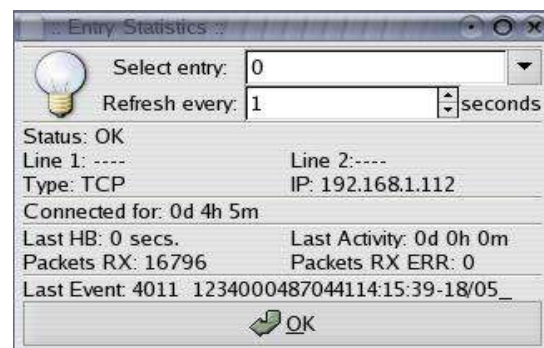


Refresh every specifies the number of seconds to wait before doing a next refresh of the screen. *Receiver status* shows status of the receiver: *OK* means that receiver is in normal operation state. *Packets RX* field shows a number of events received from all inputs. *Packets TX* indicates a number of events successfully transmitted. *Last activity* indicates a number of seconds

passed since last receiver activity. *Uptime* shows how long the receiver was running. Note that applying new configurations will cause the receiver to restart and will reset the uptime counter. *Last event* displays the last event received by the receiver.

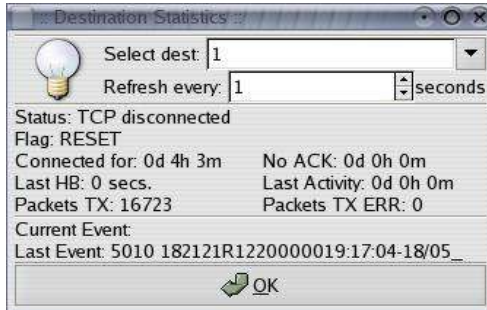
Entries stats

Select an entry to monitor from the *Select entry* drop down list. *Refresh every* specifies a time interval between information updates. *Status* field shows status of currently selected entry. *OK* status indicates a well behaving entry, any error occurred on that entry will cause *Status* to change to the corresponding error message. *Line 1 / Line 2* are used to show the line status of Exprecium cards (if the entry is an Exprecium card, which is not the case on the screen shot). *IP* field will show the IP address of a connected party (if entry is of type TCP of course). *Last HB* indicates time since last heartbeat received. *Packets RX* shows a number of events received from this entry. *Last event* shows the last received event from this entry.



Destinations stats

Select a destination to monitor from *Select destination* drop down. Specify the interval between stat refreshes in *Refresh every* field. *Flag* shows the state of the destination. *RESET* means that the last event was acknowledged and the destination is ready to accept other events. *Current event* specifies an event that is currently being send to this destination. *Last event* indicates last successfully sent event.



Cognitum local traffic monitoring

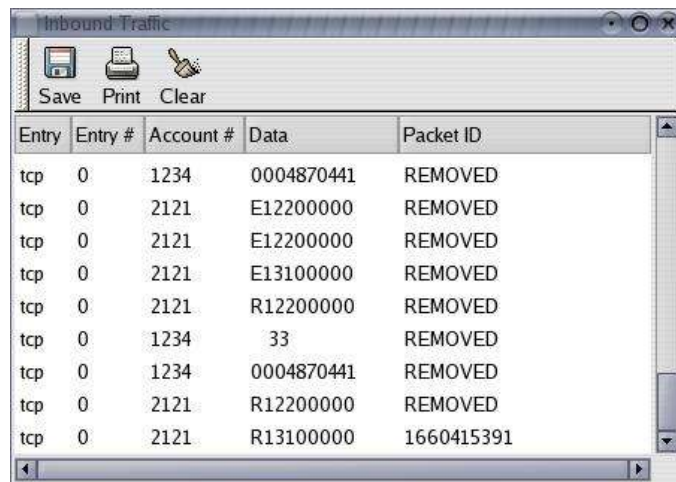
You can monitor inbound and outgoing traffic by using special monitors. Those monitors present events that either come to Cognitum system or leave it. When monitoring outgoing events, you can also see to which destinations an event was scheduled and sent. In addition to traffic monitors you can define **screen** typed destinations. Traffic to those destinations can be monitored locally using **dmclient** utility.

SCREEN typed destinations

A screen shot of a running **dmclient** with explanation.

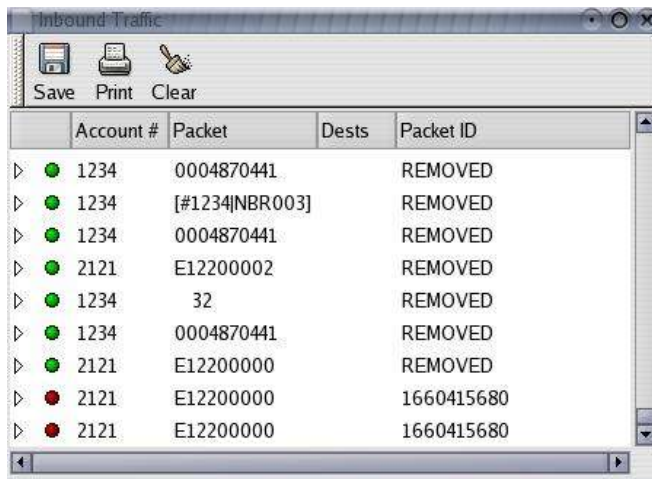
Inbound traffic monitoring

Whenever a new signal is read off an entry and an event is generated, it is add into **Inbound traffic monitor**. New events are appended into the last position at the bottom of the screen. Note that only 150 last events are shown, adding 151th event will trigger removal of the 1st one. Events which were sent to all scheduled destination are marked *REMOVED* in real-time. You can click on *Save* or *Print* button to save / print current traffic window for further references. Press *Clear* to clear off the traffic window.



Entry	Entry #	Account #	Data	Packet ID
tcp	0	1234	0004870441	REMOVED
tcp	0	2121	E12200000	REMOVED
tcp	0	2121	E12200000	REMOVED
tcp	0	2121	E13100000	REMOVED
tcp	0	2121	R12200000	REMOVED
tcp	0	1234	33	REMOVED
tcp	0	1234	0004870441	REMOVED
tcp	0	2121	R12200000	REMOVED
tcp	0	2121	R13100000	1660415391

Outbound traffic monitoring



	Account #	Packet	Dests	Packet ID
▶	1234	0004870441		REMOVED
▶	1234	[#1234 NBR003]		REMOVED
▶	1234	0004870441		REMOVED
▶	2121	E12200002		REMOVED
▶	1234	32		REMOVED
▶	1234	0004870441		REMOVED
▶	2121	E12200000		REMOVED
▶	2121	E12200000		1660415680
▶	2121	E12200000		1660415680

Outbound traffic monitor shows you events that are leaving DM core. Green bullets on the left depict events which were successfully sent to all scheduled destinations. Red bullets, on the other hand, indent events that are still in treatment. Clicking on the triangle to the left of each row will expand the tree, showing explicitly to which destination the event was sent and from which destination an acknowledge was received. You can use *Save* / *Print* buttons to save or

print events currently displayed. *Clear* will clear the window. Note that as in **Inbound traffic monitor** events are appended at the bottom and there is never more than 150 events displayed.

In the screen shot to the right, there is an example of an expanded event. It means that event shown was scheduled and successfully sent on a destination named *[screen]*.



▶	2122	R13100000		REMOVED
▶			[screen]	REMOVED

User management

Appendixes

DM state chart diagrams (limited)

DM TCP protocol specifications (limited)

Drivers

Contact / Feedback

Bug report