



# Xcor Client User Guide

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Xcor-CUG-v.3.0.4

07/28/2011

For Client software ver. 4.1.3.13

This document details the functionality of the Xcor Client software program. It provides instruction on how to quickly get started using the system and provides information on features that are accessible through the program.



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## **The Xcor Client program**

The Xcor Client program is an integral component of the Arcom Digital Hunter system. The Hunter System is based on a client / server architecture. The Xcor Client program allows multiple users to simultaneously access information contained on the Xcor Server.

In general, the capabilities of the Xcor Client are primarily “read only”. As such, the user of the Client does not have the ability to change any system settings or setup elements of the program. These types of setting and configuration changes are only allowed through the Xcor Administrator program. This separation of functionality between the Xcor Client and Xcor Administrator programs is for security and database integrity purposes to ensure that important system settings - some of which could adversely affect the network - can only be changed by authorized users.

The Xcor Client can safely be provided to anyone in the organization that has a need to access information contained within the Hunter system.

## **Hunter high level system overview**

A simple description of how Hunter System works is that it uses an operator’s existing QAM channels as a radar probing signals. With our Xcor technology, these signals provide the ability to find the time distance to certain types of impairments within an HFC network. The next step is to query a database generated from electronic maps of the system. This database contains time distances to every device in the network. The database query outputs the number of devices that match the measured time distance within a certain tolerance. Field hardware and software tools are then used to find the exact device that is the root cause of the network impairment. Hunter detects sources of CPD, measures CNR of return path signals, detects network affecting pulse noise in the return, reports on node outages, and with i-Scout probes installed in the field it defines exact zone of ingress. It also provides easy historical viewing and trends of CPD and CNR. More detailed information on system operation can be found at [www.arcomdigital.com](http://www.arcomdigital.com).

## **The Hunter system components**

The system is comprised of several hardware and software components.

### **Radar and Server**

Used at the headend to prioritize, display and store data relevant to those nodes that need attention. The server contains device databases, CPD databases, and CNR databases if the Xplor component is installed. Data on the server can be accessed by multiple users running the client. Additionally, each hub server can periodically send system statistics data and equipment status reports to a centrally located server that



accumulates data from multiple hubs and monitors current hardware and software status. This repository software is called MHV Server (Multi Hub Viewer server).

### **Quiver**

The passive field radar and advanced SLM. Quiver is used to determine the time distance to network impairments. It is used in conjunction with the Quiver Navigator to precisely display the location of network impairments. Quiver also contains a return path spectrum analyzer, forward spectrum analyzer, Zero Span mode with Pulse Noise detection and Analog Leakage detector.

### **Xplor**

An optional software package that allows collection of return path CNR, laser clipping and impulse noise data for each node. It is a required component for use of i-Scout probes.

### **Quiver Navigator**

A software package resident on either a laptop or Quiver that is used by field personnel in conjunction with Quiver radar data. Quiver Navigator displays node maps for one or multiple hubs, and flags the location of candidate devices – locations that could be the root cause of the network impairment.

### **Switches**

Return path switches are located at the headend and are connected to test points of each node receiver. They are controlled by the server and present nodes to the radar and server sequentially for analysis.

### **i-Scout Probes**

An optional field component that is used to precisely determine the section of plant that is the source of ingress or CPD.

### **Xcor Client and Xcor Administrator**

Software components used to access and utilize data stored on the Xcor server.

### **MHV Server Client**

Software components used to access and utilize the MHV Server



## How Hunter is intended to be used

For best results, it is recommended that Hunter be used as follows:

Capture statistics on CPD, CNR, Impulse Noise and Laser Clipping at the headend and use tools contained within the Xcor Client to prioritize which nodes have the most severe CPD. If the Xplor module is installed the user can also capture and prioritize those nodes that contain CPD and CNR problems. This information, as well as other system inputs such as trouble calls, data from CMTS', etc., can be used to determine priority as to the order in which nodes should be attended to. This manual is intended to provide instruction on how the Xcor Client and Xcor administrator functions such that this step can be performed easily and efficiently.

Go to the node with the Quiver and determine distance and direction of the CPD source by connecting Quiver to node test points (as described in the Quiver user manual).

Enter the time distance as measured by Quiver into Quiver Navigator. Then either proceed directly to the source or trouble shoot to downstream split points in the network as required.

Find and repair the deficient component.

Use headend view features of Quiver to confirm that the problem was fixed.

In systems with installed i-Scout Probes, the first step will be to review the i-Scout scan report and then to start the search deeper into the network, at the first device within or the device immediately before the identified zone.

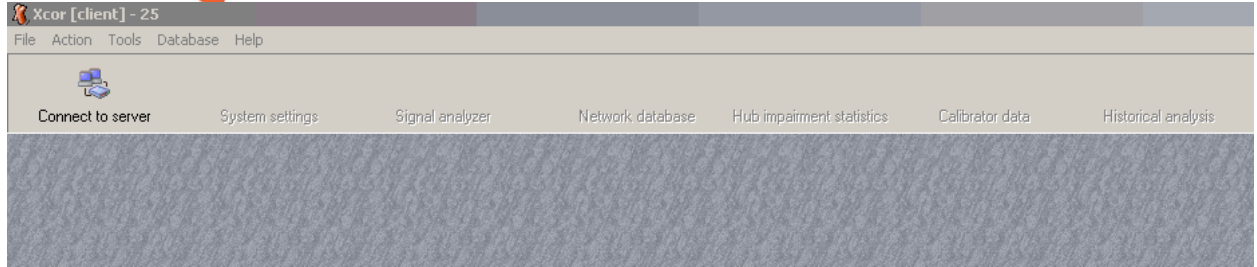
## How to use the Xcor Client program

### Setup and installation

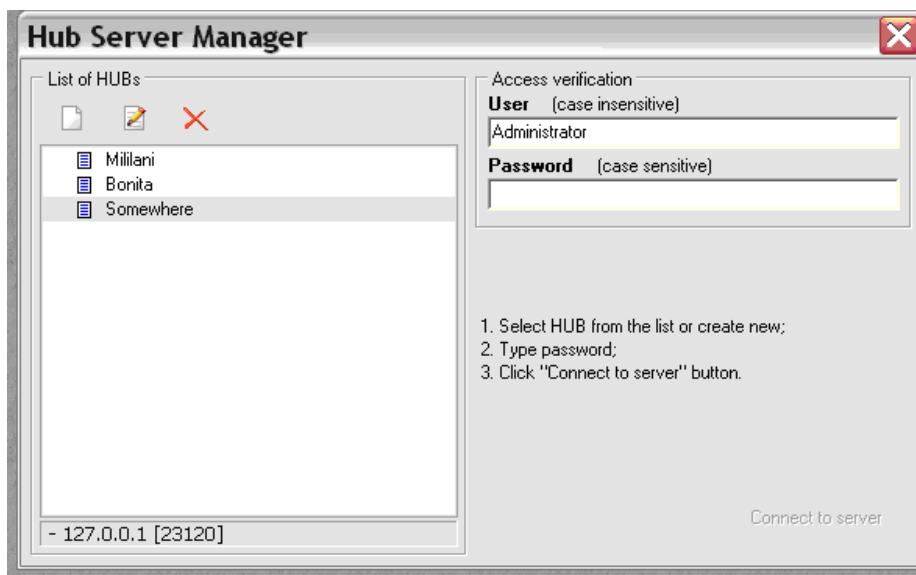
To launch Xcor client run the XcorClient\_setup x.x.x.exe program as supplied by Arcom Digital.

### Connect to server

After launching the Xcor Client at the sign-on screen, click on *Connect to Server* to access hub sites.



Then click on the hub name you wish to connect to, type in the user name and password, then click on the *Connect to Server* button on the bottom right portion of the window. Once connected the other icons on the menu bar will become visible.



If you need to create a new hub or change information about an existing hub (such as an IP address that has changed), press the F1 key and the software help file will provide specific instructions. The *create*, *edit*, and *delete* buttons are located below the list of HUBs.



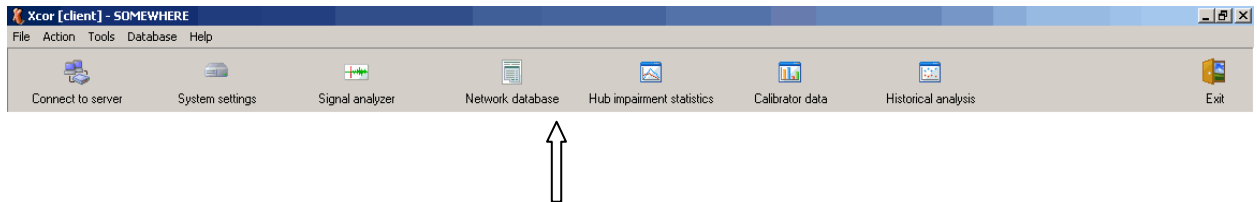


## View Hub Impairment Statistics

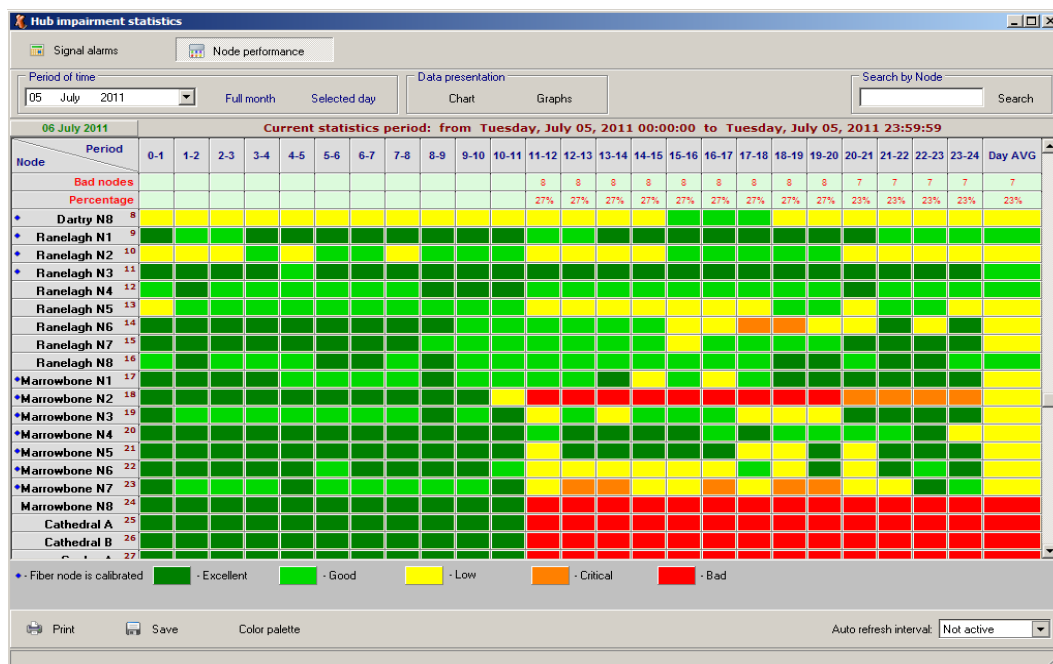
The Hub impairment statistics has two functions. To give access to Node performance data and to provide access to the various signal alarms and associated records.

### Node performance

Click on the Hub Impairment statistics icon on the menu bar:



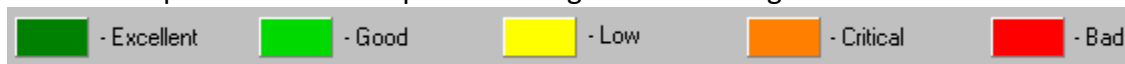
A window with the records of Hub impairment statistics for the current day will open. The first window shows *Node performance* information displaying the status of each node according to the rules set by the Admin in the system settings. The node condition for each hour is marked with a different color for the various conditions. With a quick look users can easily determine those nodes that need attention. It also provides an easy way to customize and filter displayed information according to desires rules established by the user.





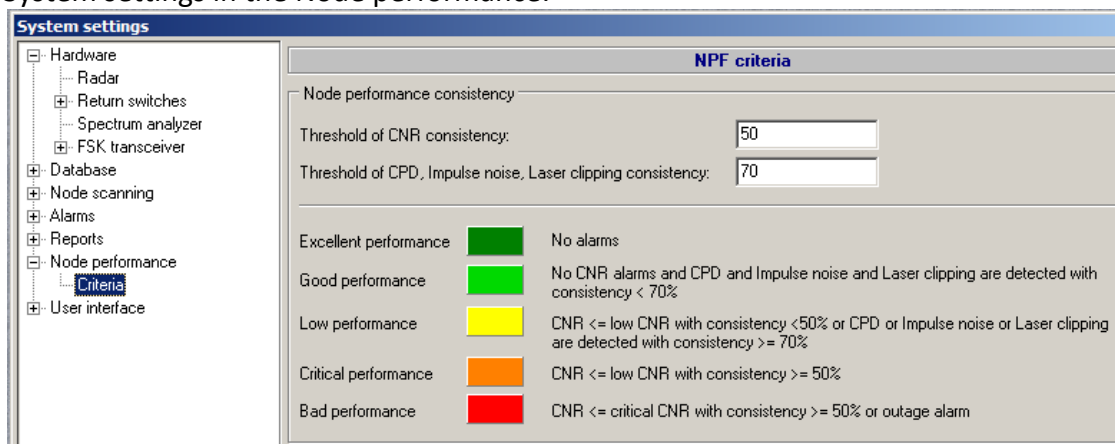


The bottom part of the screen provides a legend associating color to condition:



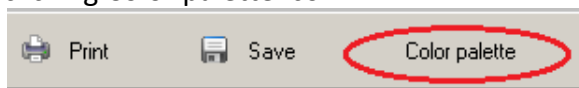
## Node performance color palette

Decision criteria on the parameters that are associated with each color can be found in System settings in the Node performance:

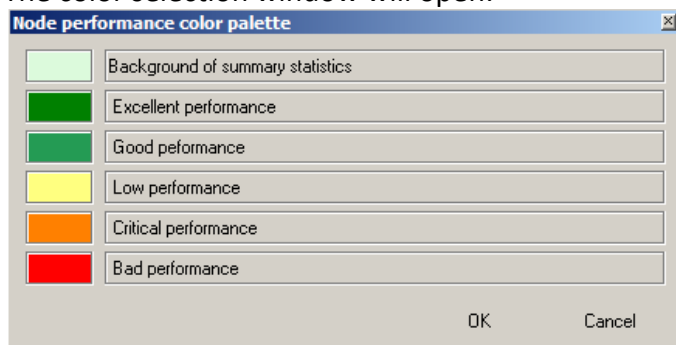


The colors that define performance can be changed by the Administrator.

The user can change the colors used on the local Client as well. Colors can be selected by clicking Color palette Icon:



The color selection window will open:

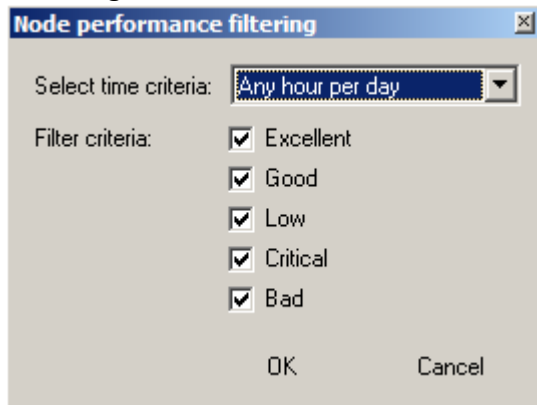


Click the desired color rectangle to open color choice tool.



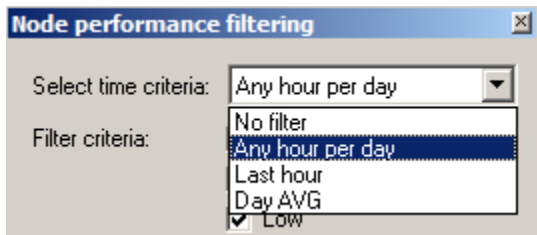
## Node performance filtering

Data can be filtered. Right click at any place in the Node performance window opens the following menu window:





Select Filter criteria by checking the boxes next to the desired node condition that should be displayed on the screen.

From the pull down menu select time criteria when certain node performance status should occur to be take in consideration by the filter:



After selecting parameters click OK to start filter action.

The screen can be printed and saved into a WMF file using the icons  Print and  Save accordingly.

The WMF file name contains a date and time stamp. It is saved into a folder of location depending on the Windows OS version.

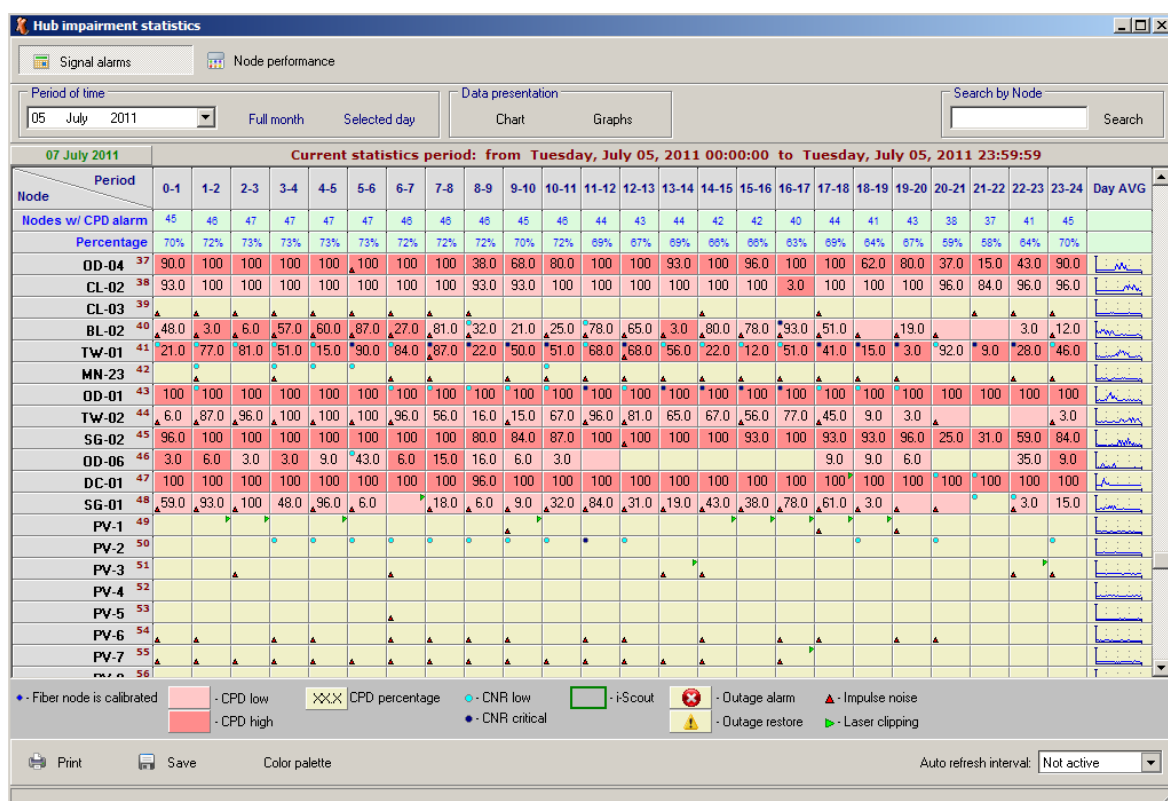
For Windows XP the path is C:\Documents and Settings\UserName\My Documents\Xcor\Data\Chart.

For Vista the path is C:\UserName\Documents\Xcor\Data\Chart.

For Windows 7 the path is C:\Users\UserName\Documents\Xcor\Data\Chart

## Information in Signal alarms window

The window provides information about CPD, CNR and pulse noise occurrences for each hour timeslot within the day (x-axis) for each node attached to the network (y-axis). The different color boxes represent the existence of high or low level CPD (the high and low indication is determined by a threshold setting as configured through the Xcor Admin program). The number inside of each colored box represents the existence of CPD as a percentage of the number of scans on a particular node. The CNR and pulse noise alarm conditions are indicated by the existence of the corresponding marker within each hour record. Information about the signal's occurrence is also based upon configured detection thresholds. From this window you can access the signal records for particular scans. You can also easily view CPD, CNR and pulse noise data presented in the form of either a Graph or Chart.



## Impairment markers and their actions

The following information can be accessed:



icon in Day AVG column opens a window that displays accumulated and averaged CPD occurrence information as well as i-Scout detection results for the day.



icon indicates high threshold CPD level reached in 100% of scans with low CNR threshold occurrences. The green frame indicates that in this hour i-Scout demodulation was also performed.



icon indicates low threshold CPD level reached in 52.9% of scans with critical CNR alarm occurrences in that hour and pulse noise



icon indicates that during that hour, CPD was recorded only with the Hour Average noise compression, low CNR alarm records are present



icon indicates that during that hour only low CNR alarm records are present



indicates outage alarm



indicates that node returned to normal operation after outage

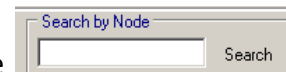


- Impulse noise indicates impulse noise detected

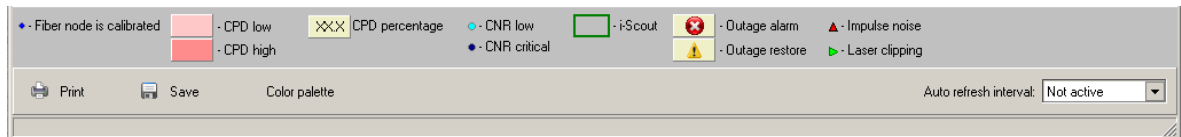


- Laser clipping indicates laser clipping detected

To bring the required node data to the top of the table, use



The bottom of the statistics screen contains a legend that describes the meaning of the different colors displayed, both for the boxes and the circles and numbers within the boxes. As with any screen in the program, more detailed information on the functionality of each screen can be quickly accessed by pressing the F1 button.

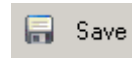


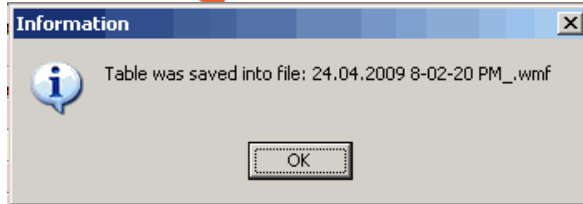
The color palette can be changed by the user by accessing color change tool icon:



The screen content can be printed – left click on  button.

### Saving Signal alarm window screenshots

The screen content can be saved as a WMF file by using  button. After successful operation the following message appears:



The file name contains a date and time stamp. It is saved into a folder of location depending on the make of the Windows OS.

For Windows XP the path is C:\Documents and Settings\UserName\My Documents\Xcor\Data\Chart.

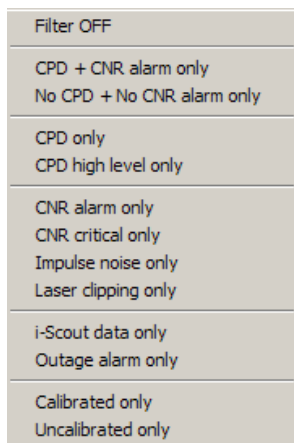
For Vista the path is C:\UserName\Documents\Xcor\Data\Chart.

For Windows 7 the path is C:\Users\UserName\Documents\Xcor\Data\Chart

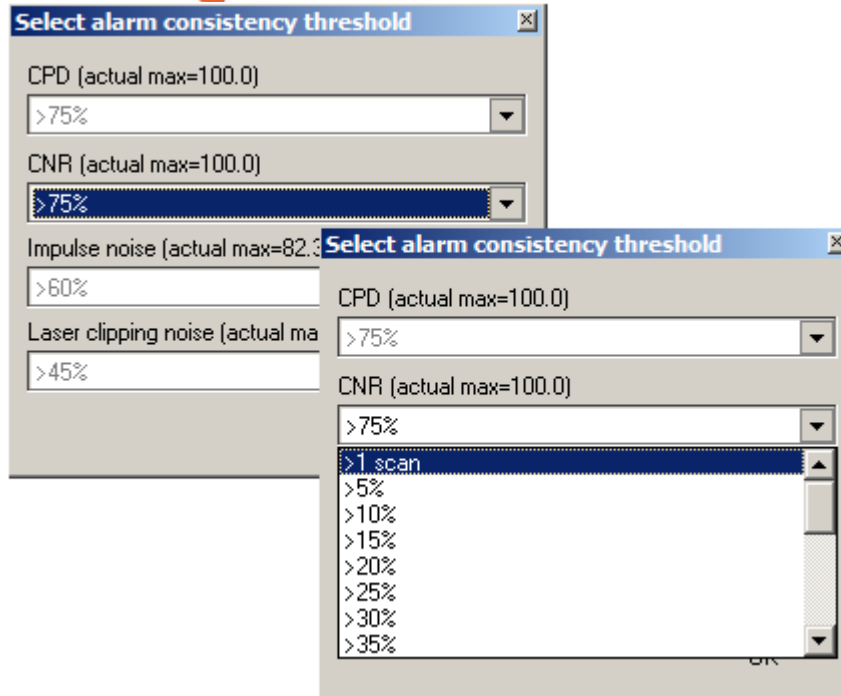
Information on the Hub impairment statistics screen can refresh automatically by selecting the refresh interval in  the pull down menu.

### Signal alarms filtering

Data in the Signal alarms window can be filtered. Right click at any place in the Node performance window opens the following menu window:



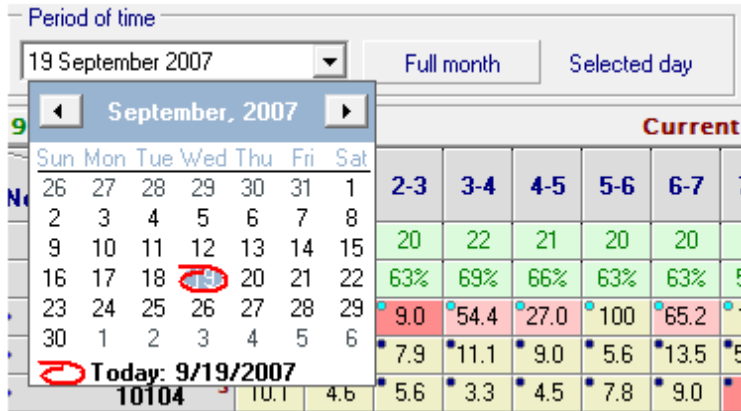
Select desired impairment combination and the impairment consistency menu will open:



Pick required alarm consistency threshold in the available highlighted pull down menu, then click OK to start Filter action. If you select '>1 scan', the filter will take in consideration all instances (even a single one) of selected impairment type detection. If you select 'all' then the filter shows only nodes which indicate impairment presence at all the scans during an hour.

### Changing dates of displayed summary data

The data displayed can be easily changed to a prior date by selecting the desired date from the pull down menu in the Period of time section at upper left portion of the screen. Either summary information on the Full month or information on the Selected day can be chosen by clicking the appropriate button then clicking on Selected day.



### Prioritizing results: step 1

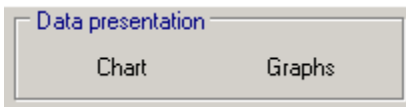
Arcom advises fixing return path problems by first attacking CPD sources associated with CNR alarms. Often a source of CPD is also the source of other network impairments like ingress. A simple determination of which nodes have the most severe CPD and critical CNR can be found by opening the Hub impairment Statistics Database and accessing the Chart feature for all nodes, or Graph for selected nodes in selected timeframe.

### Viewing Charts and Graphs

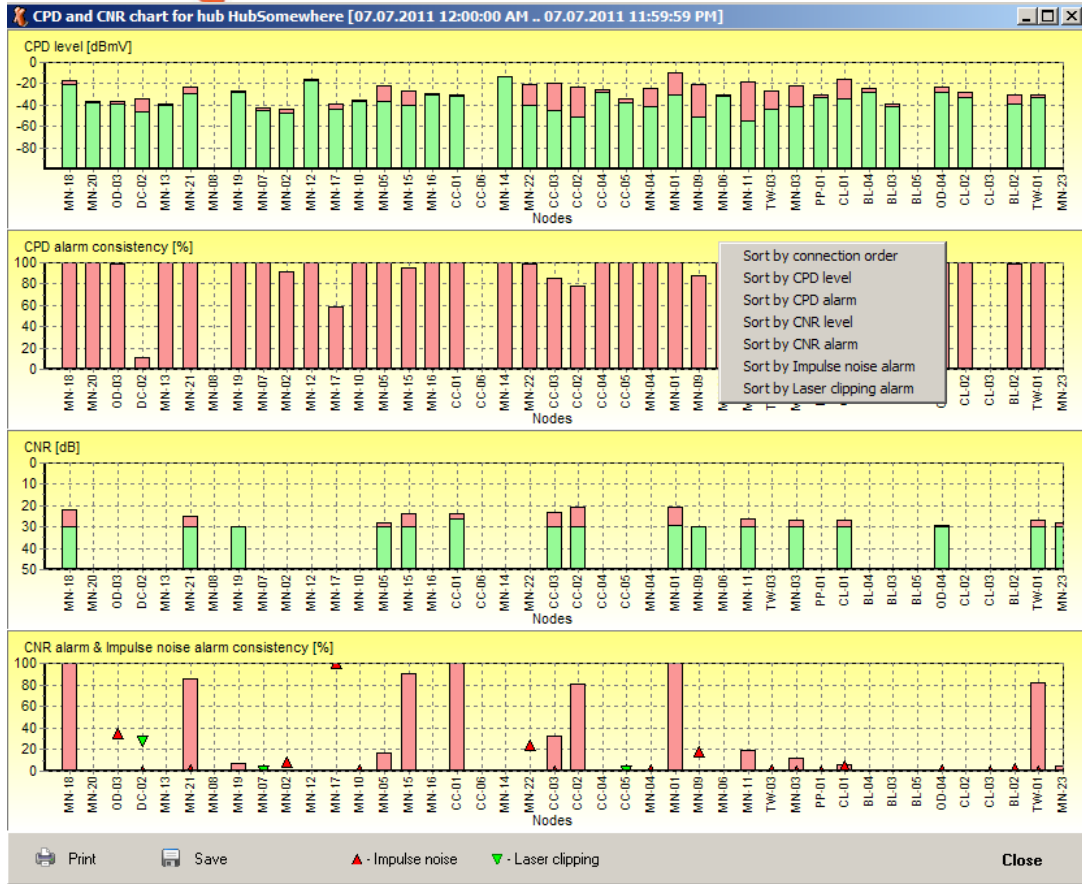
The Hub impairment data presentation - Chart feature displays summary information on CPD, CNR, pulse noise and laser clipping for each connected node. The data can be displayed either sequentially by node or prioritized by conditions set in the Filter.

#### CPD and CNR charts

To access this feature, click on the Chart button as shown below.



The following window will appear:

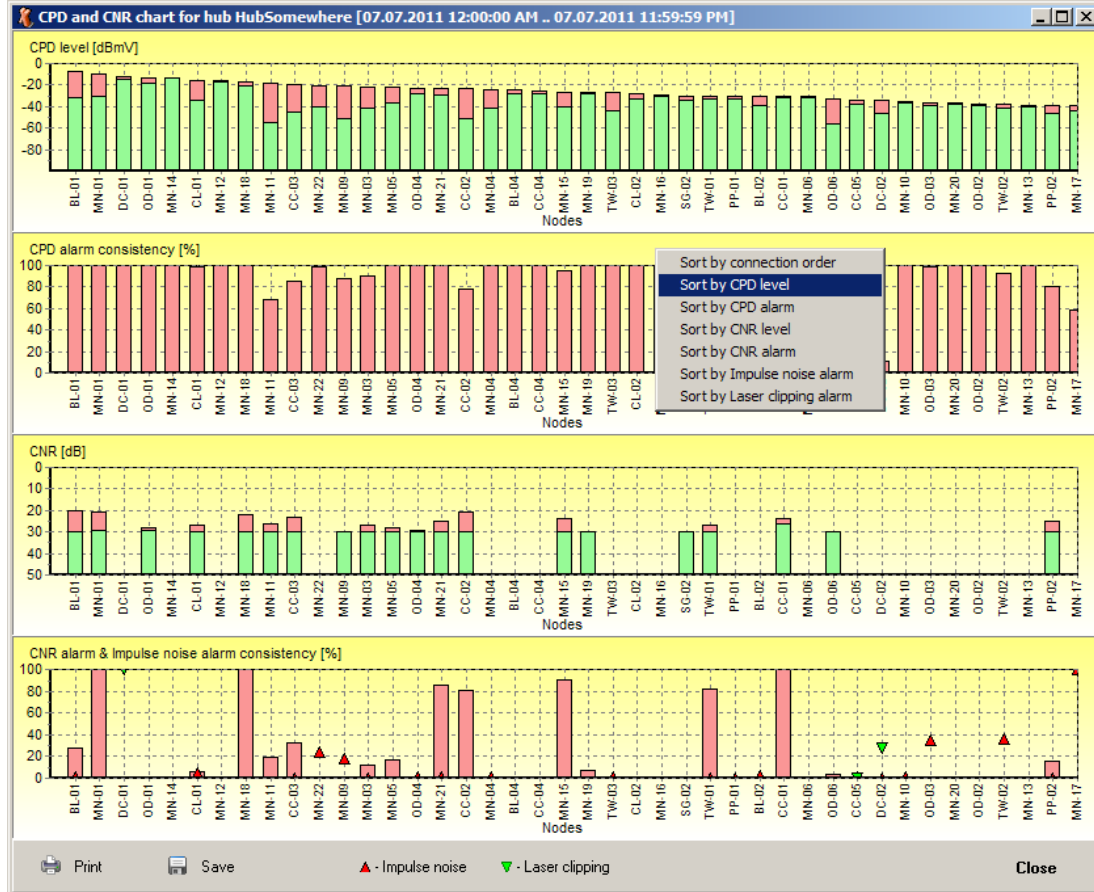


The screen shows information on impairment level and impairment consistence – this parameters tells how often the scans are reporting presence of certain impairments, bars reaching 100% mean that all scans are reporting presence of impairments.

### Chart data filtering


Right clicking anywhere in this window opens a Filter that will allow the option to change the order of the nodes – and allows displaying from most severe to least severe, as well as sorting displayed data by many other conditions.





The red bars in the charts above green indicate changes and the range of recorded impairment levels between the various scans for each node in the time period currently displayed in the Hub impairment Statistics Database. Occasionally a CPD source will be charted as a single green bar with no red – this means that the CPD was either extremely stable, or most likely it represents just a single very short duration CPD that was only recorded once.

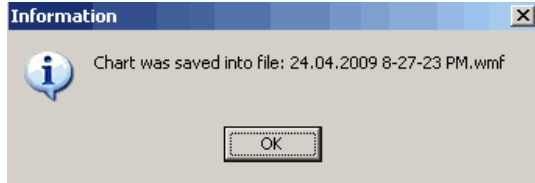
In establishing a priority it is suggested that the nodes with the largest and most consistent sources of CPD, especially those related to consistent CNR alarms are selected first. Certainly if there are other inputs, either in the form of trouble calls, non responding modems, etc. – then it is suggested that these nodes be prioritized as most urgently needing repair.

The charts can be printed – left click  Print button.

## Saving chart screen

The charts can be saved as WMF files by using  button.

Successful operation is confirmed by a message with the file name containing time stamp:




For Windows XP the file is saved in C:\Documents and Settings\UserName\My Documents\Xcor\Data\Chart.

For Vista the file is saved in C:\UserName\Documents\Xcor\Data\Chart.

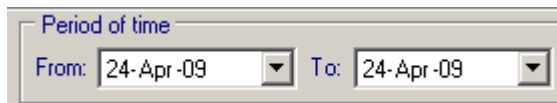
For Windows 7 the path is C:\Users\UserName\Documents\Xcor\Data\Chart

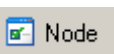
## Level graphs – impairment stability

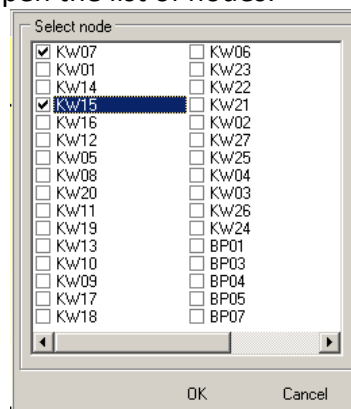
The Graphs feature opens access to graphs showing CPD amplitude and measured CNR levels for the selected number of nodes in a selected timeframe. This is very useful in planning work. Users can check if the particular nodes are display stable or intermittent CPD sources during certain times of the day and plan accordingly. Using this method, field work can be planned for at times when the impairment reaches its periodic maximum which allows for easier and quicker search.

To draw a graph for node or a group of nodes, left click  button.


Then on the calendar select the time frame for which the graph will be created using

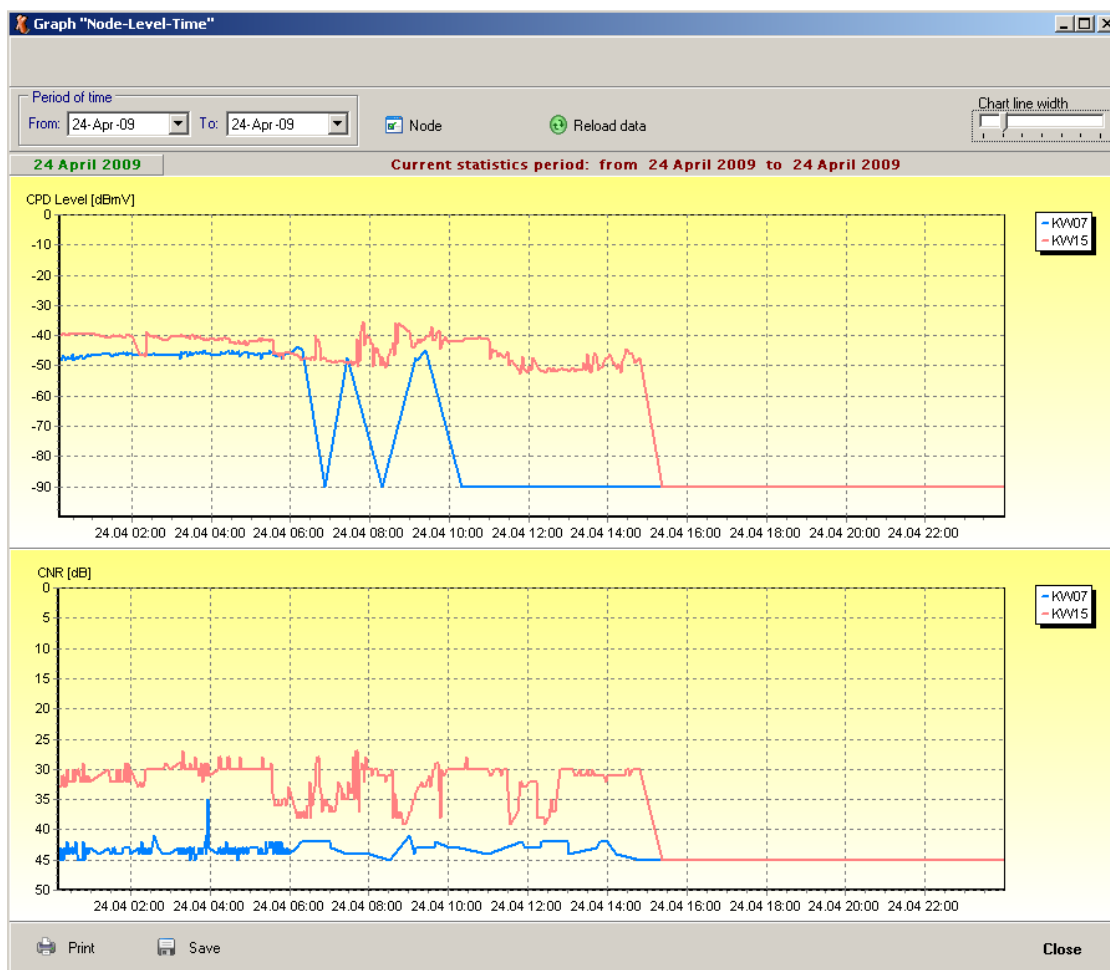


Left click  button to open the list of nodes:





On the list, check desired nodes to creating graphs for, then click OK and the  button. After some time depending on the amount of data transferred for creating graphs, the screen will show the curves:



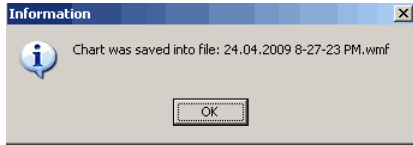
The curve section can be zoomed in by holding the left mouse button and selecting the desired area by creating a rectangle starting from the upper left corner. Zoom out function is created by creating a rectangle in the opposite fashion by starting with the right bottom corner. The graph can be repositioned by holding the right mouse button and moving to the desired location

### Saving graph screen

The graph can be saved as WMF files by using  button.



Successful operation is confirmed by a message with the file name containing time stamp:



For Windows XP the file is saved in C:\Documents and Settings\UserName\My Documents\Xcor\Data\Chart.

For Vista the file is saved in C:\UserName\Documents\Xcor\Data\Chart.

For Windows 7 the path is C:\Users\UserName\Documents\Xcor\Data\Chart

Press the F1 key for detailed information on saving and printing data for each window.

## **Prioritizing results: Step 2**

If i-Scout probes were not installed skip this step.

In systems with installed i-Scout probes the next step is to check the i-Scout detection results.

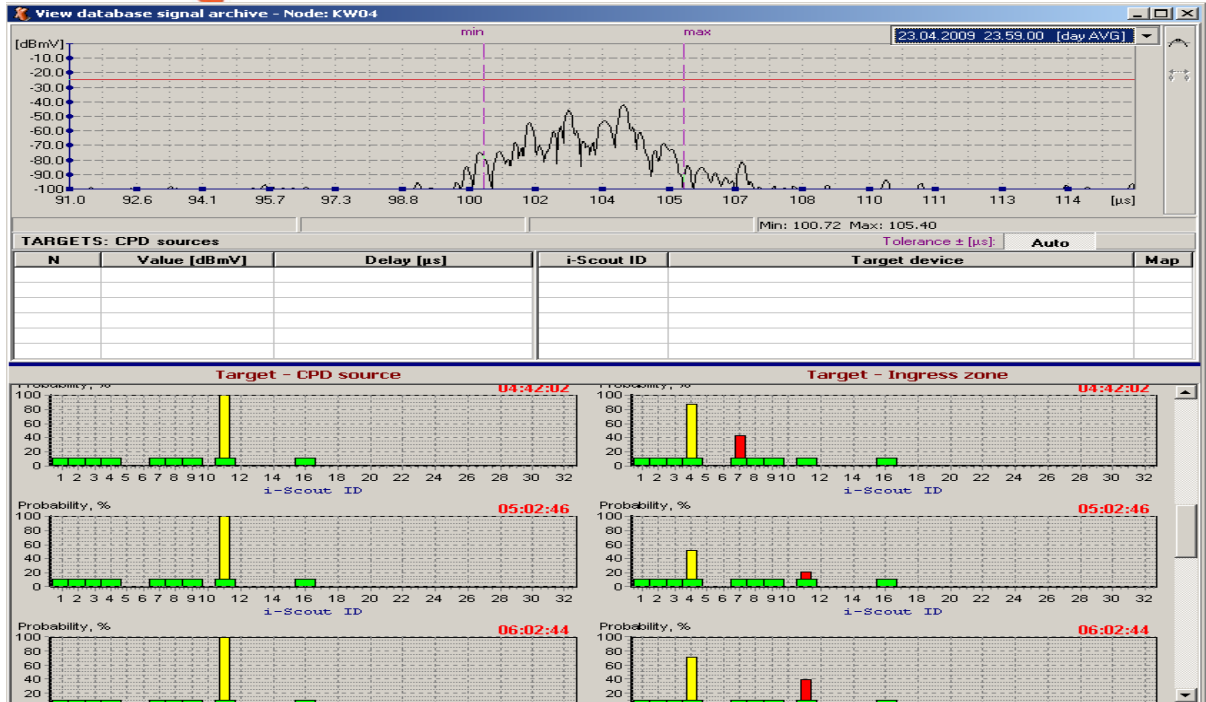
### **i-Scout detection**

The detection results contain information about specific zones within the plant that are sources of CPD and Ingress. We also recommend checking detection results from previous days to determine consistency of the selected CPD. This will allow for scheduling field work in the narrow zone for the time frame when the signal is strongest and easy to detect.

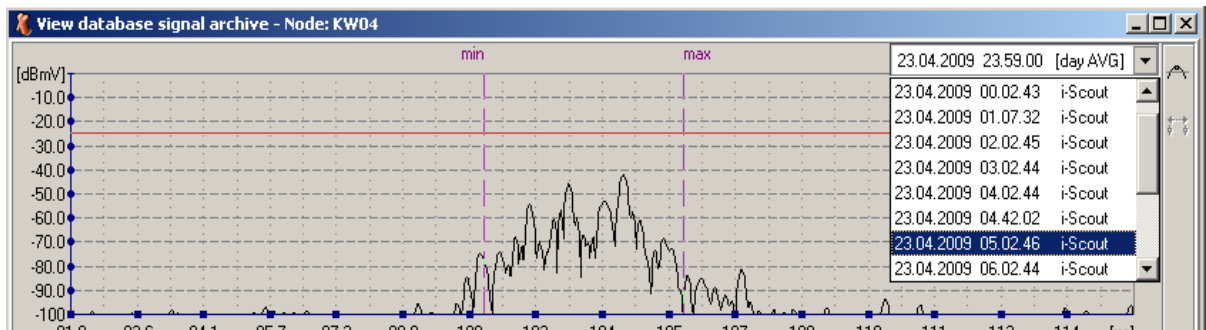
### **Impairment zone stability check**

Begin with checking if and when the readings are consistent and the problem can be found. Open the Day Average record for the desired node and check on the list of the i-Scout detections if for the particular impairment indications the same probe ID's are being displayed.

The bottom part of the report contains i-Scout reading reports for each hour when the i-Scout scan was made.

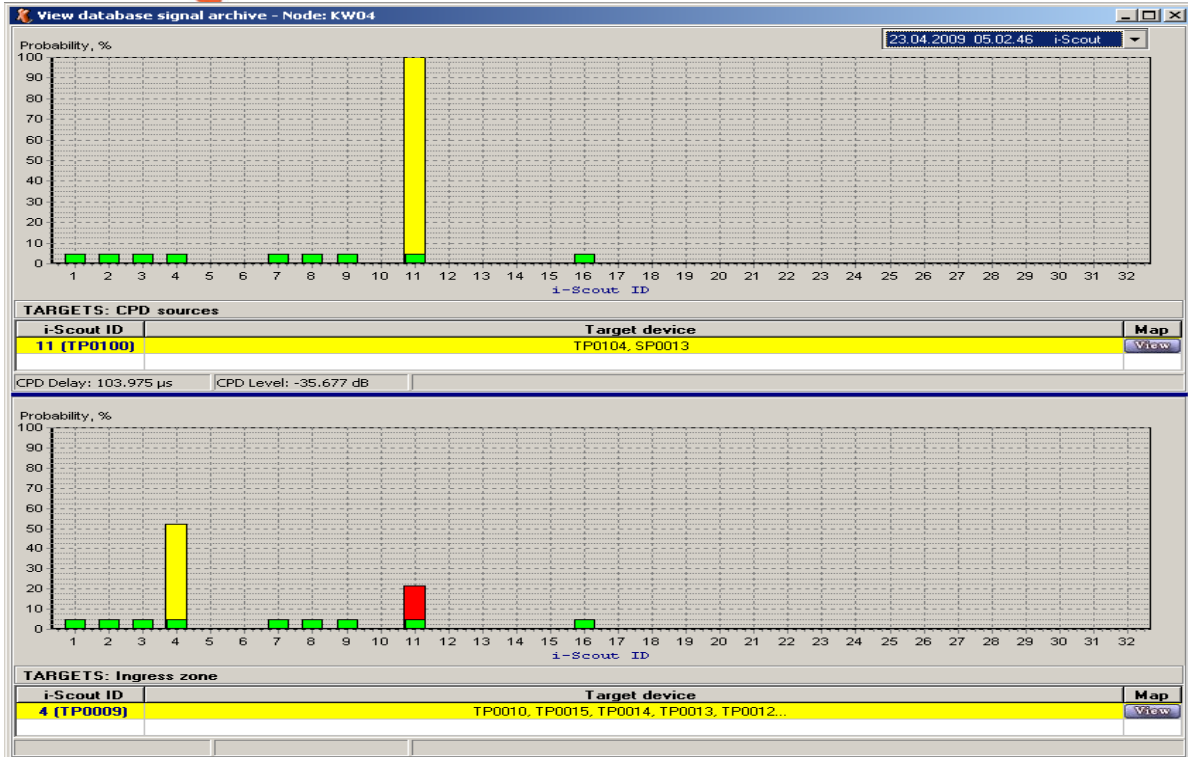


In this example probe ID #11 is indicated consistently for CPD source and probe #4 for ingress zone, the next step is to open the hour record from the timeframe when indications are consistent (here at 5:02 a.m.):



### Viewing CPD narrow zone

Once the stable scans are located, click one of them in the pull down menu and the record for the selected hour opens:



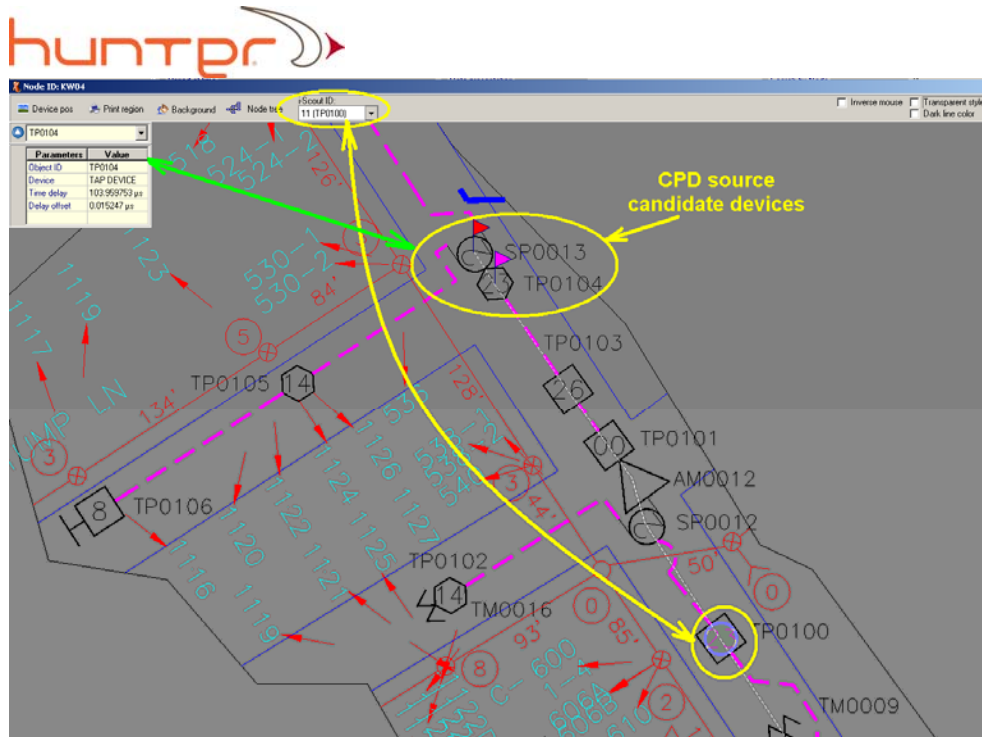
In the above screen, map sections can be viewed that indicate the zone of the marked impairment.

**TARGETS: CPD sources**

i-Scout ID	Target device	Map
11 (TP0100)	TP0104, SP0013	<a href="#">View</a>

CPD Delay: 103.975  $\mu$ s CPD Level: -35.677 dB

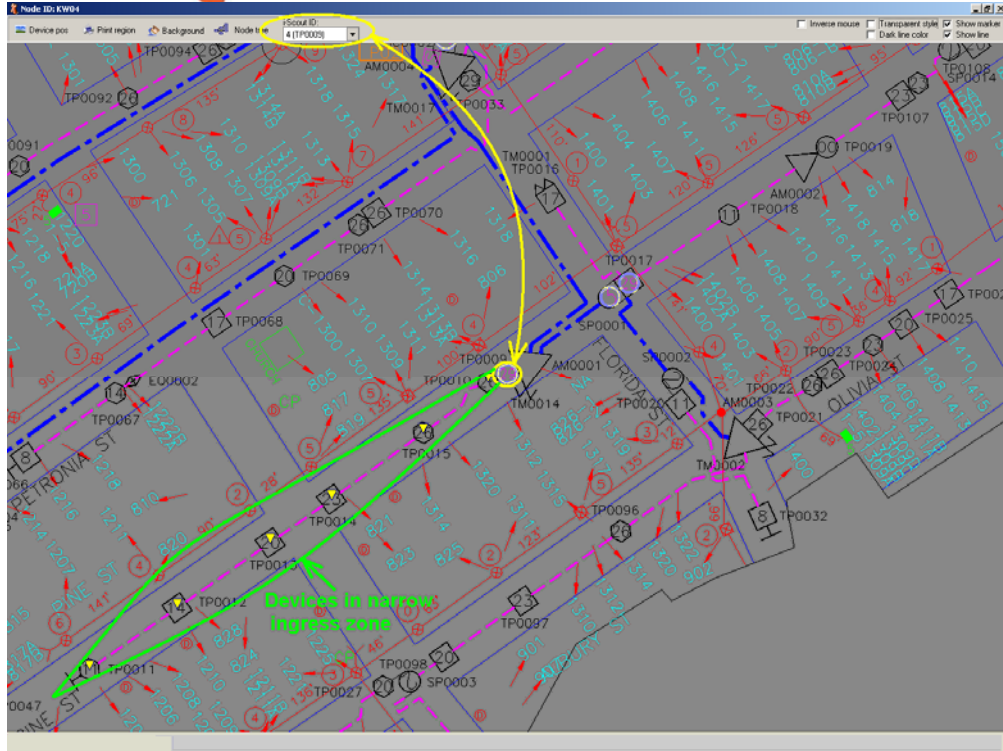
The above bar indicates that the target device causing the CPD at time delay of 103.975  $\mu$ s is located past the probe ID 11. By left clicking on [View](#) in the target bar, the map opens:



The i-Scout probe #11 is installed at TP0100 devices and that is the start point for ranging the CPD with the Quiver and Quiver Navigator in the field. Simply go to this location or the most convenient location upstream of this device. Refer to the Quiver Manual with specifics on how to proceed.

### Viewing Ingress narrow zone

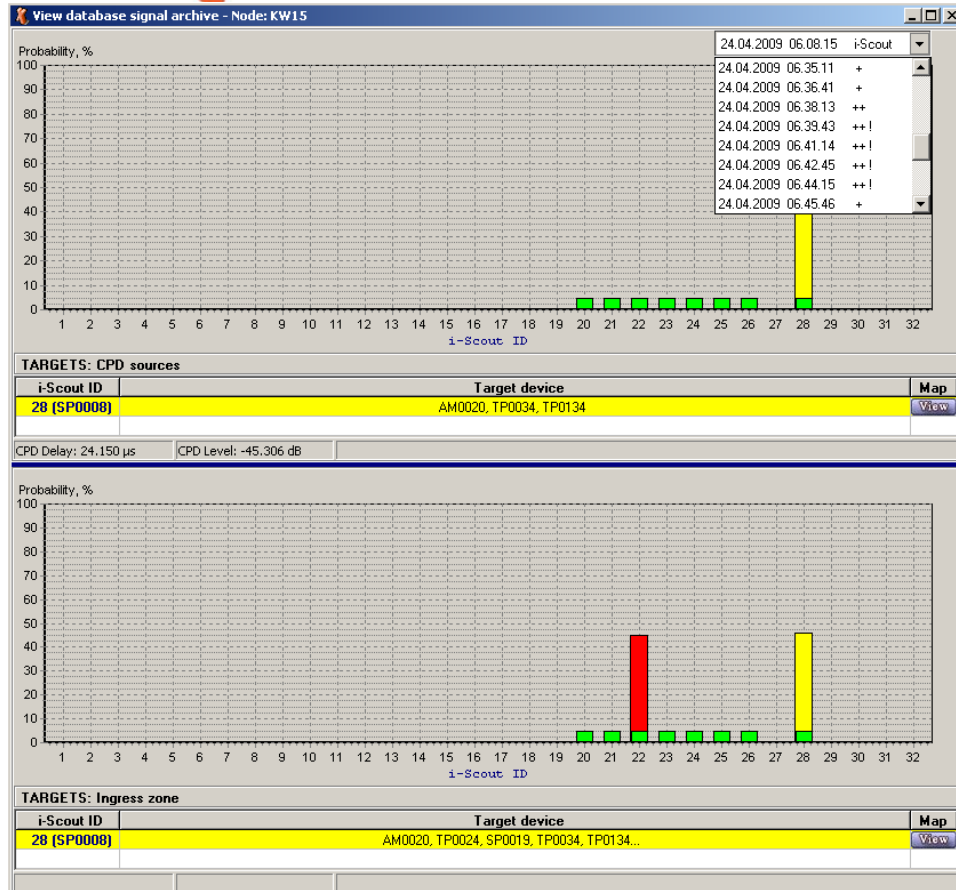
For ingress the target data bar offers similar access to the map:



by starting a

um analyze






In the upper right corner of the screen the pull down list with the record list is located. Select the pull down list to access the scan history within the time slot. The first record shown will be the i-Scout detection report for CPD and Ingress.

Scroll down to some of the most recent records – if a + or ++ is shown, it indicates that CPD was present during the scan (+ indicates the presence of CPD and ! indicates the presence of CNR alarm - ++ indicates high level CPD and !! indicates critical CNR alarm). The last record at the bottom of the list contains the hour average graph for CPD detection and a spectrum screenshot of the first scan in the hour. That record is useful for intermittent CPD detection in very noisy conditions. Note - the screen may refresh if there are many records made and you are connecting with the server remotely.

If for some reason you want to view the signal record from the pull down list, simply click on the desired time stamped record and the screen will refresh and display the desired record.



In the example above, the map with information about CPD source narrow zone location

can be viewed by clicking on the map View button  located in TARGETS: CPD sources section. The map will show CPD source candidates indicated after the detected i-Scout (id # 28 in this case):

### Prioritizing results: Step 3

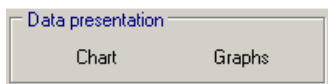
In order to find a CPD source in the field it must be a relatively stable source. Therefore, prior to assigning a technician the task of fixing a CPD source on a particular node it is a good practice to first check that the source is stable.

This can be accomplished in two ways.

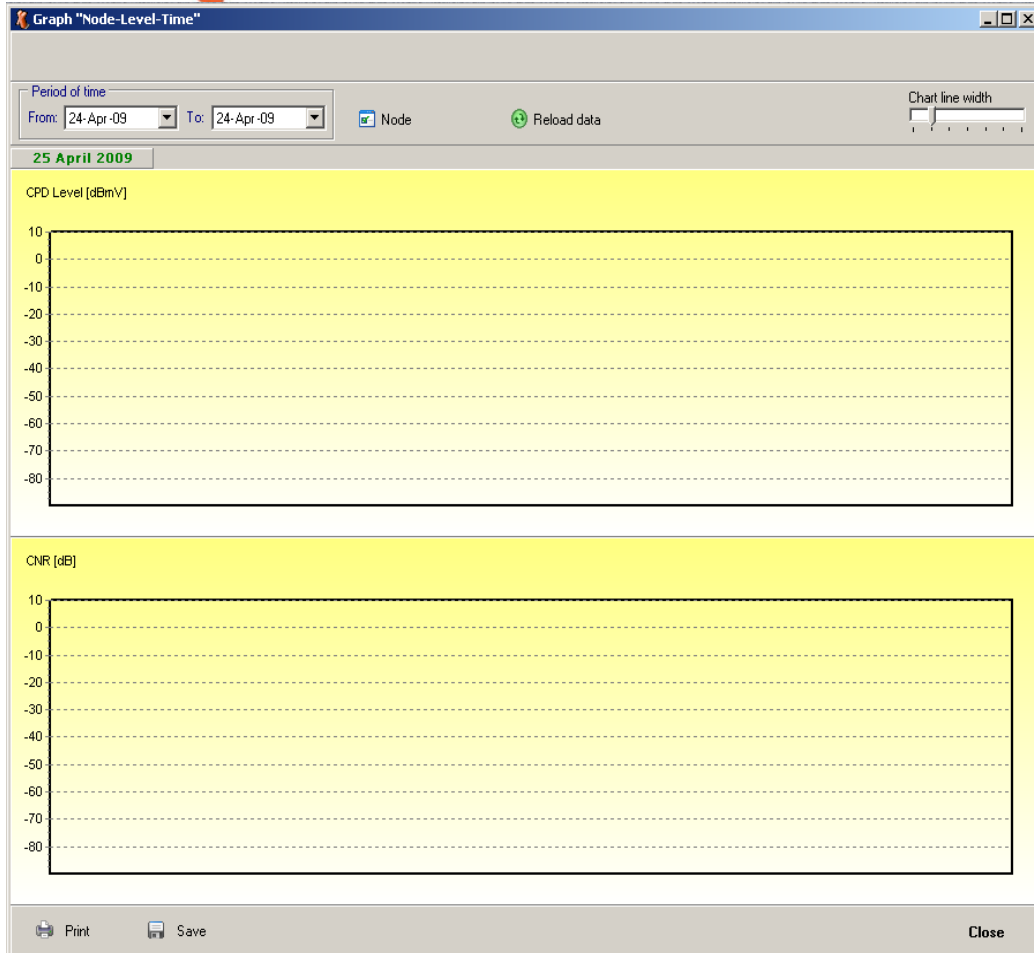
Use the alarm consistency information in the Chart accessible from the Hub impairment statistics or look at the % number within the Hub impairment statistics database. *Note – the % number does not have to anywhere near 100% to be able to find the source in the field. CPD is recorded at the headend only on occasion when a threshold level is exceeded. The Quiver used in the field has no such threshold, and it can easily view very low level CPD. At locations with low return signal levels use the QAMP to amplify the return signal.*

Use the node Graphs feature contained within the Xcor Client as described below to view historical information on variations of CPD levels within each node.

The Graphs feature displays information on CPD and CNR levels for user selected nodes. To access the feature click on the Graphs button as shown below.

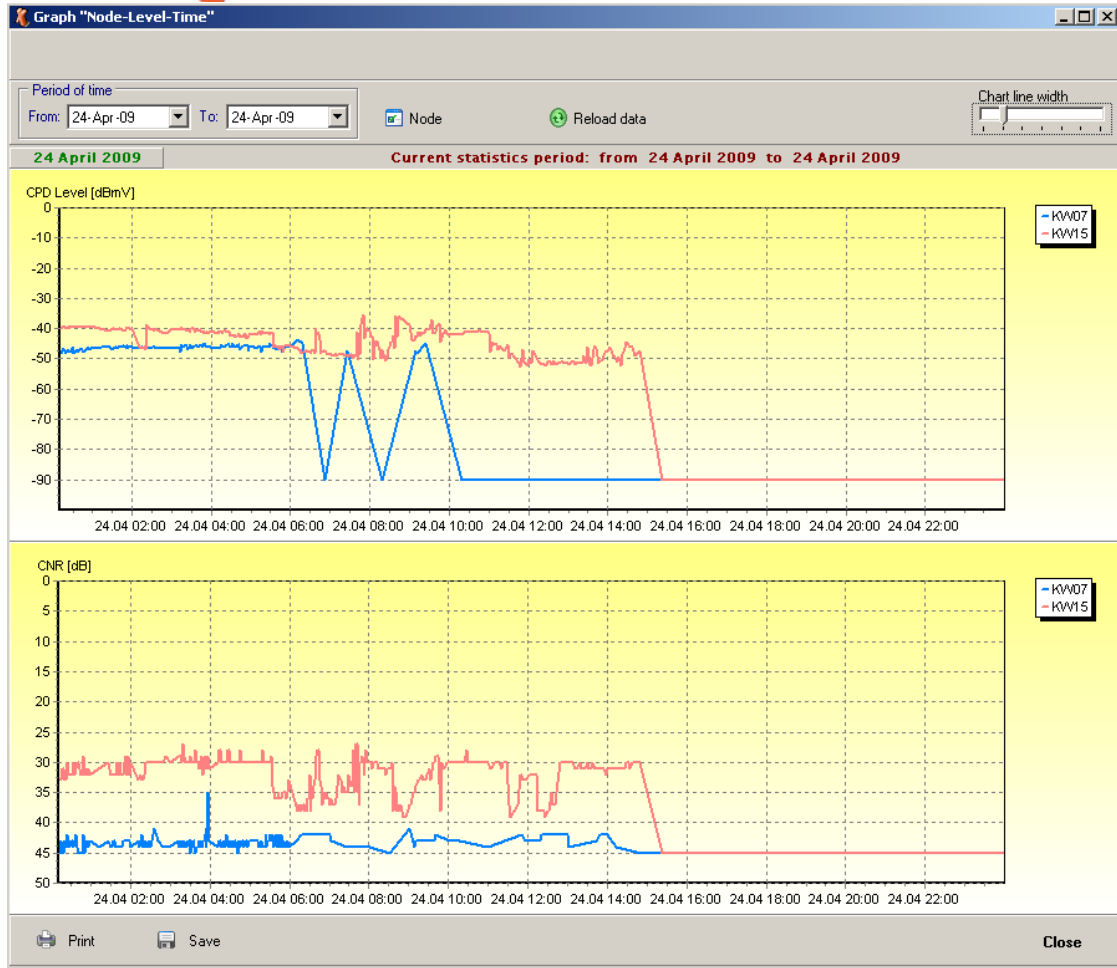


The following window will appear:



Click on Node/time scale and the desired date range to select the nodes you would like to view (multiple nodes can be selected). Then press Reload data.

A graph similar to the following will appear. The red curve refers to a CPD source that is very stable and can be easily located using Quiver and Quiver Navigator. It also has serious impact on the CNR parameter:



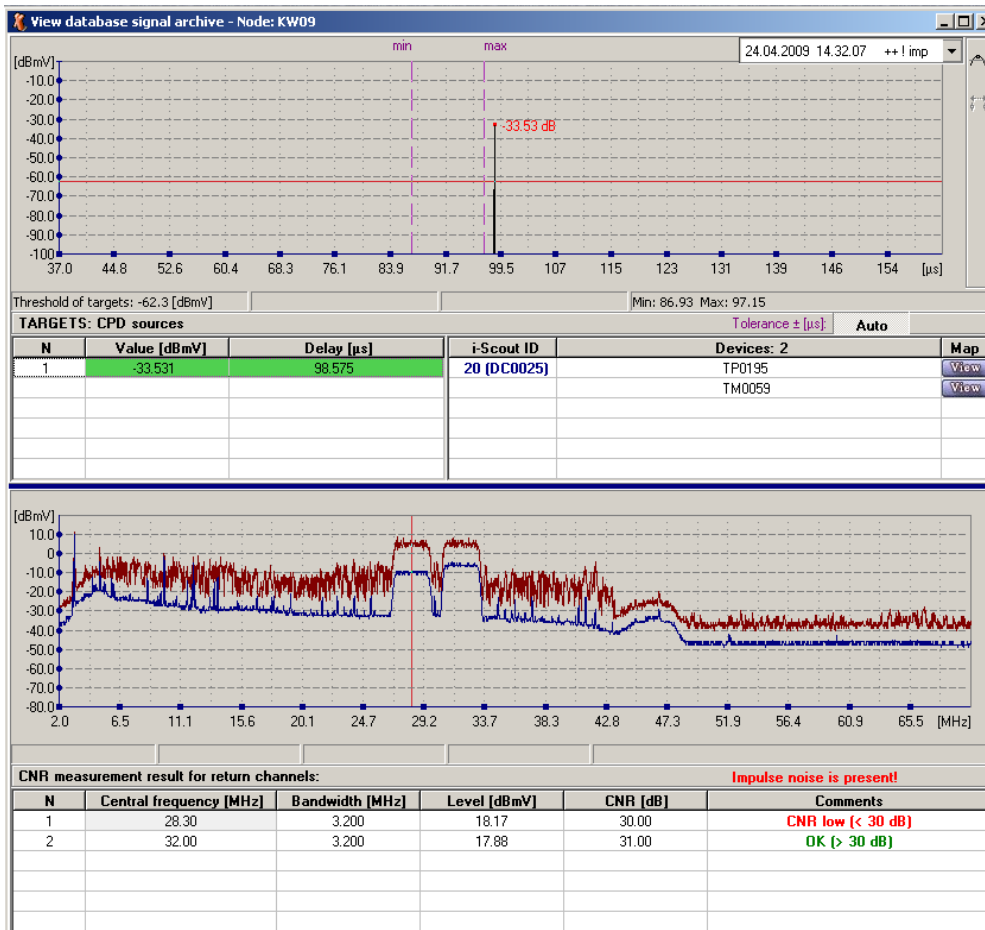
If a node does not display a steady CPD – and the source comes and goes at various times like the blue curve, it may be useful to analyze the graphs over a few days in order to determine if the CPD is always present during a certain time period. If such a pattern is identified then the field work can be scheduled during this time of day. The Graphs feature is very useful in analyzing this type of signal behavior.

### Checking presence of non-stable CPD

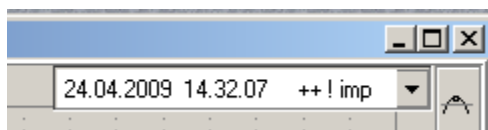
This step is only suggested if the CPD you want to hunt is not consistently present (in the range of <50%). In situations such as this, it is recommended that immediately prior to going in the field, you first view a recent scan for that node to determine if CPD is currently present, or alternatively look at a graph of the daily levels for that node.



Return to the Hub impairment statistics window and double click on the right most cell (i.e. the most recent record displayed in the node of interest). A screen similar to the following will appear.



A pull down menu with the list of the records made in last hour is available.



Select the pull down window in the upper right portion of the screen to access the scan history within the time slot.

Scroll down to some of the most recent records – if a + or ++ is shown, it indicates that CPD was present during the scan (+ indicates the presence of CPD and ! indicates the CNR



low alarm - ++ indicates high level CPD and !! indicates CNR critical alarm). Note - the screen may refresh if there are many records made and you are connecting with the server remotely.

If for some reason you want to view the record from the pull down list, simply click on the desired time stamped record and the screen will refresh and display the desired record.

If the CPD is present then go to the node with the Quiver and the Quiver Navigator tools to determine the location of the problem.



## Additional useful features

### F1 key - in-program help screens

Detailed Help screens are available for all portions of the Xcor Client and Xcor Administrator programs. Simply press the F1 key and the help screen will be displayed.

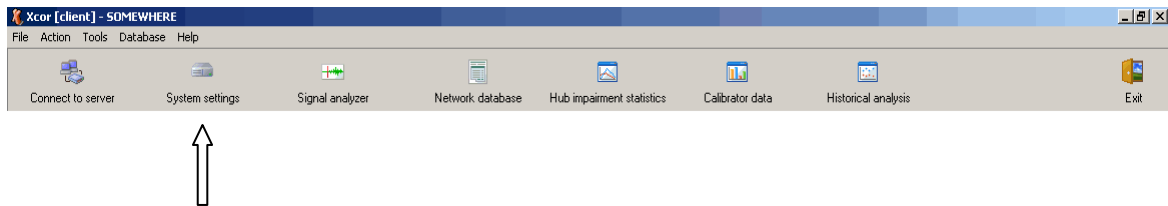
### Scheduling node scans

Hunter operates by continually and sequentially scanning each node. In a typical configuration each node is active for approximately one second. As such, in systems with large node counts it could take a few minutes to cycle through all of the nodes. When working in the field with Quiver, in order to use the headend view and to perform node calibrations it is necessary for the connected node to become active in order to transmit data. To speed up this process, and to ensure that field personnel do not have excessive wait times, the system has the ability to schedule scans on selected nodes at selected dates. When a node is selected for a scheduled scan, the continual sequential scanning

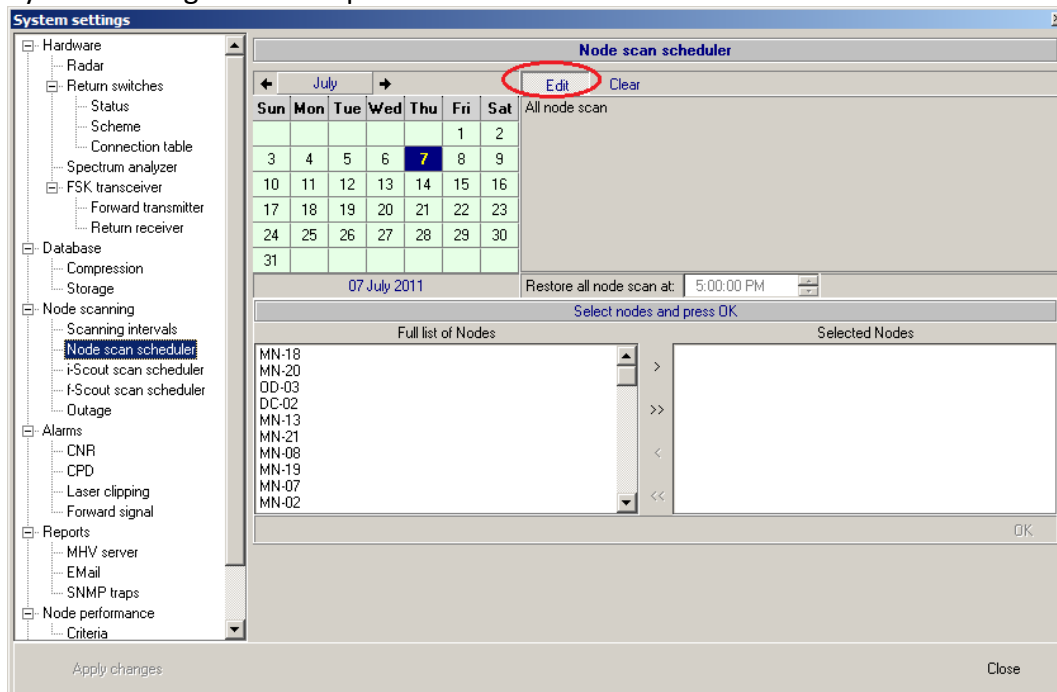


process is continued – with the exception that the selected nodes are scanned more frequently.

Scheduled scans can be configured from the Xcor Client. First open the system setting tab, then click on the scan schedule tab.

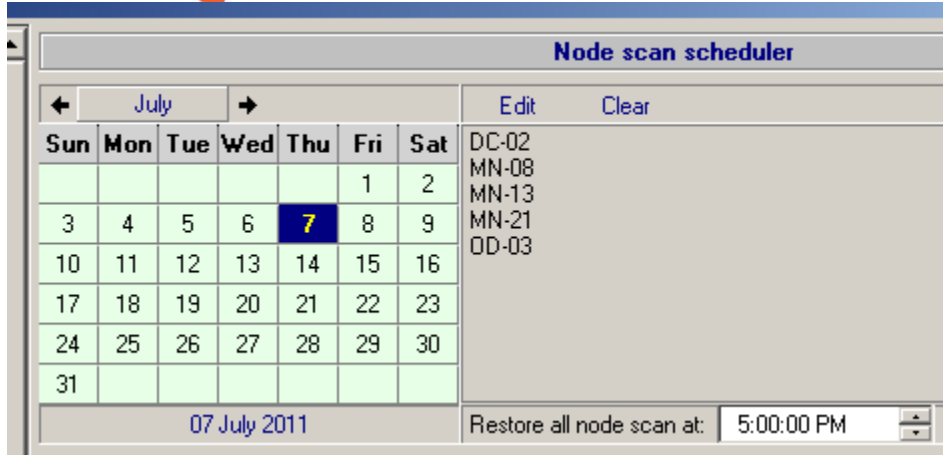


The System settings window opens in Scan Scheduler at once:



To add nodes to the short scanning list, first select the day and then highlight the desired node ID from the Full list of Nodes box and click on “>” to move it to the Selected Nodes list. You can also remove the nodes from a Selected Nodes list by moving it back to the Full list of Nodes.

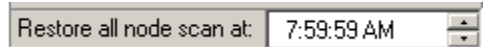
The figure below shows a screen with nodes currently scheduled to be scanned.



The screenshot shows the 'Node scan scheduler' window. It features a calendar for the month of July 2011. The days of the week are listed at the top: Sun, Mon, Tue, Wed, Thu, Fri, Sat. The dates are arranged in a grid. The date '7' (Thursday) is highlighted in blue. To the right of the calendar, there are buttons for 'Edit' and 'Clear'. Below the calendar, there is a text field labeled 'Restore all node scan at:' with a time value of '5:00:00 PM' and a dropdown arrow.

It is recommended so you always have the Scan Schedule set for a selected day before going into the field with the Quiver.

If necessary, set the time when the system should return to normal scanning sequence -



The screenshot shows a text field labeled 'Restore all node scan at:' with a time value of '7:59:59 AM' and a dropdown arrow.

After settings are made, click  to save the data.

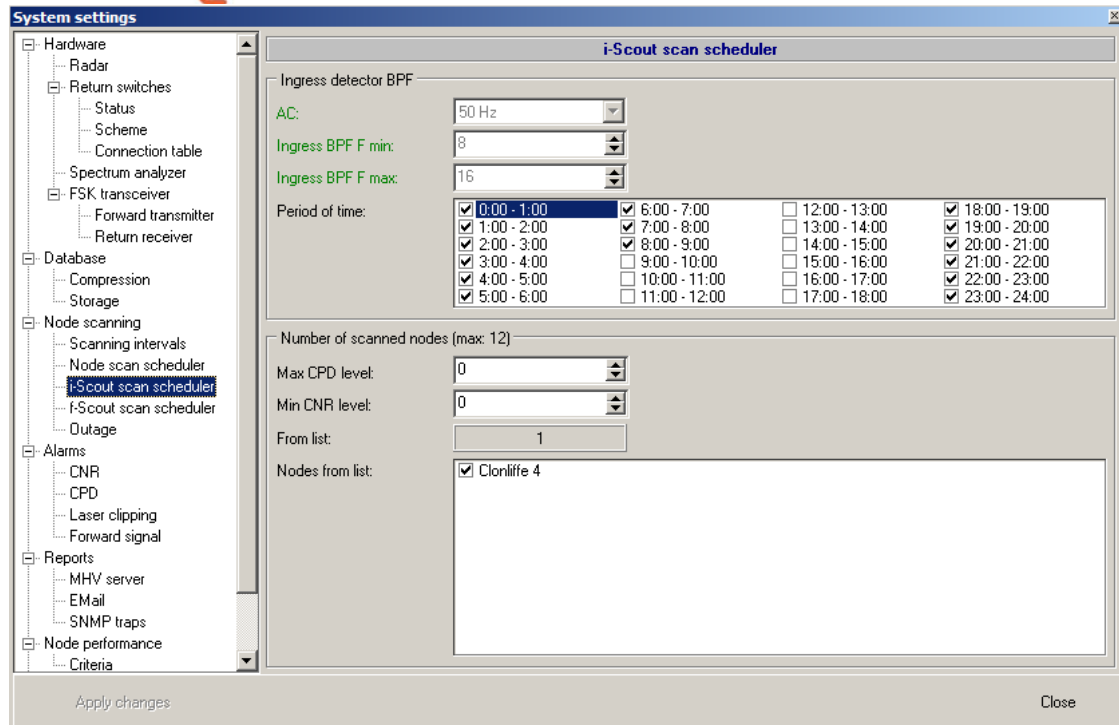
Note: putting all nodes into a short scanning list does not speed up scanning process.

## Scheduling i-Scout detections

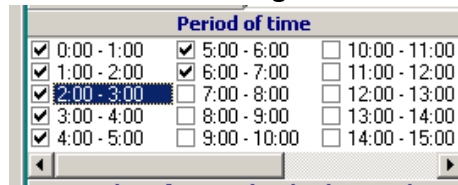
i-Scout demodulation in one node requires 150 seconds. In order to provide flawless operation of the system during daily technicians activity, the signal analyze can be performed in the time slots which do not disrupt work in the field. It is proposed to scan i-Scout early morning, at noon and late afternoon.

The i-Scout Scan Schedule is accessed from the System settings window:





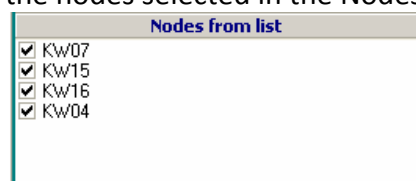
## Period of time settings



The time slots when that process is taking place can be selected in this window. Automatic i-Scout scanning will be performed then only in the time frames selected by the user. In the moments when the scanning is active the database signals can be viewed, but access to Signal Analyzer in manual mode will be blocked.

## i-Scout node scanning patterns

The system will scan for i-Scout modulation in up to 12 nodes per sequence. It will scan the nodes selected in the Nodes from list window:





And in the nodes selected by the following rules:

Number of scanned nodes (max: 12)	
Max CPD level:	0
Max Ingress level:	0
From list:	4

But the total number of nodes included in scanning will not go beyond 12.

The above scanning rules will allow scanning of all the nodes which are affected by CPD or ingress.

## Viewing System settings

When you click on the System settings button from the main menu, the following screen appears.

**System settings**

**Node scan scheduler**

July

← → Edit Clear

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

05 July 2011

Restore all node scan at: 5:00:00 PM

Apply changes Close

The tree like structured menu on the left hand side of this screen gives access for viewing setup parameters for each device and the software. To view parameters of each item, click the desired menu item.

The Xcor Client allows only for viewing the settings for the Xcor Radar, Return Path Switches, Spectrum Analyzer, CNR alarm, Scanning Intervals, Outage alarm, EMail

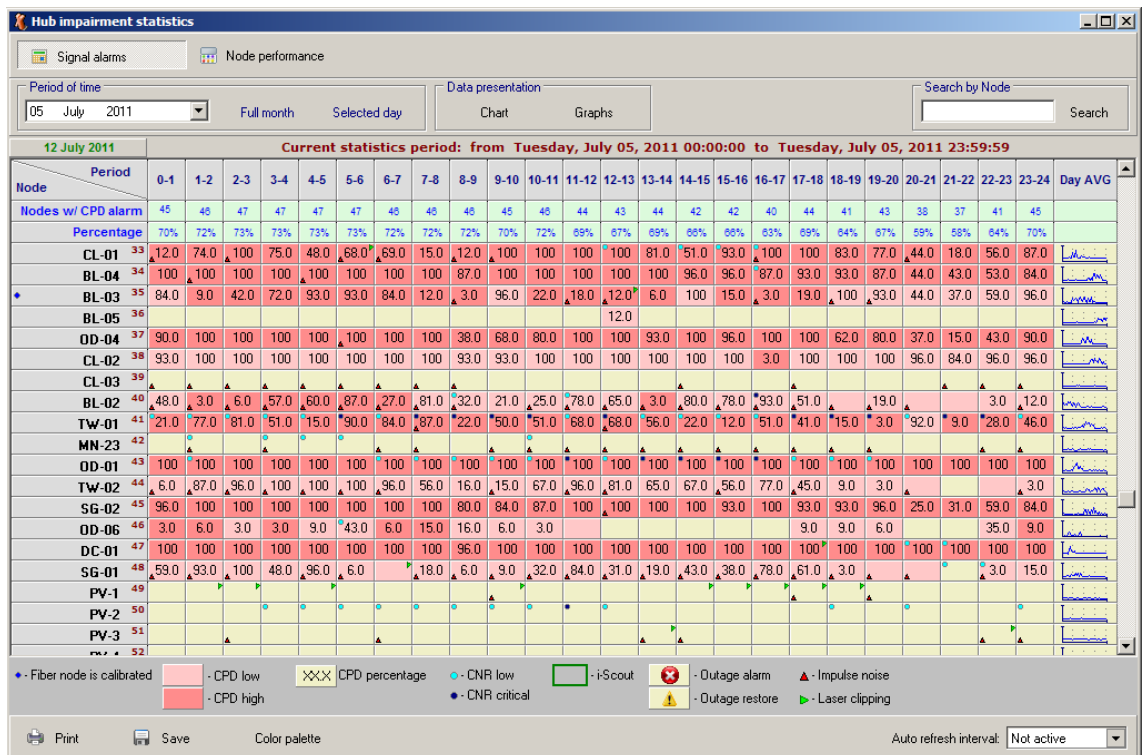


Reports, Database Compression, and MHV server. Changes to these various settings can be made with Xcor Admin only. Xcor Client does allow viewing and changes to the Scan Schedule and i-Scout Schedule settings tab.

The only settings that are adjustable by the Client user are related to the node scanning scheduling.

## Signal records access

This is a recap of information provided in step 3 of the on *Prioritizing Results* section of this manual. Open the *Hub impairment statistics DB*, select *Signal alarms* and in the next window click on a desired box to view stored data.





## Spectrum and CPD radar scans

Single record of CPD radar and spectrum analyzer data:



Signal records provide information about the CPD signal in simplified form - a vertical bar with amplitude and time delay position corresponding to the detected signal parameters. Note that the system cross-correlation noise floor is not stored since it is not relevant to CPD source position and would consume large data storage space. At the same time CPD is recorded, the spectrum snapshot is taken and displayed in the bottom part of the window (*this spectrum snapshot feature is only active when the Xplor module is installed*). The time delay for CPD signals can be determined by using the marker line.

Using the left mouse button, catch and hold the (green in the example screen) horizontal threshold line and move it below the CPD peaks.

Click on the marker icon located in the right upper corner of the screen.





The time delay to each CPD source will be displayed below the CPD graph part of the screen for each CPD source.

TARGETS: CPD sources		
N	Value [dBmV]	Delay [μs]
1	-32.875	626.875
2	-37.395	633.725

Note – the information presented here and in the *Map view* is not intended to assist the user in determining location of a problem in the field. For locating the CPD sources the Quiver and the Quiver Navigator map aid must be used in the field. The i-Scout detection report provides proper information about the narrow zone of the fault location, but the precise device locations must be defined within the narrow zone from the field using Quiver for CPD and traditional methods for ingress sources.

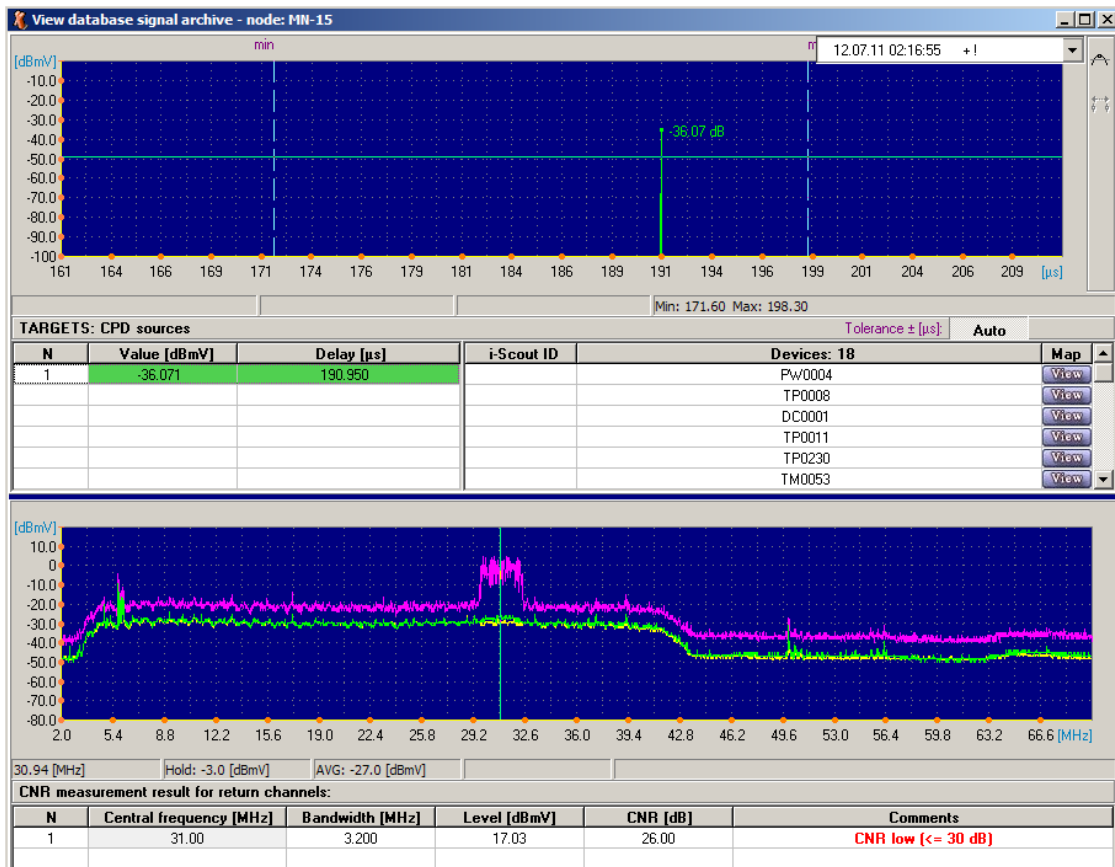
If the i-Scout is installed then the very first screen shows a report for the i-Scout demodulation for the selected hour. If for a particular hour the i-Scout scan wasn't scheduled, but the probes are installed in the selected node, the report below the CPD signal graph includes information about possible narrow zones for the detected CPD source highlighted with green color:

i-Scout ID	Devices: 3	Map
22 (DC0012)	TP0150	<a href="#">View</a>
	AM0026	<a href="#">View</a>
	TP0149	<a href="#">View</a>

For the field search, use the i-Scout scan reports.

The spectrum snapshot shows fine details of the data signals. Below the spectrum graph, the CNR parameter measured for each data carrier is displayed. There can be displayed CNR low and CNR critical alarm messages as well. There can also be an indication of pulse noise occurrences and laser clipping. There are three colors of the signal plot that mark the max hold, average and 'under QAM' lines. In the signal record example the purple line marks the max hold data, the green line marks live signal and the yellow trace part shows the signal while the data carrier is absent. The yellow trace shows details of the signal under the QAM. The advanced spectrum analyzer operator can use it in many ways.

An Impairment record example is shown below:



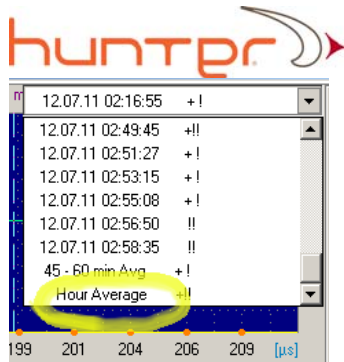
The frequency of the signals in the spectrum screenshot can be read properly only by using the vertical line that server as a marker.

Grab and move the vertical line marker to the desired peak and read the peak parameters in the following screen section below spectrum plot:

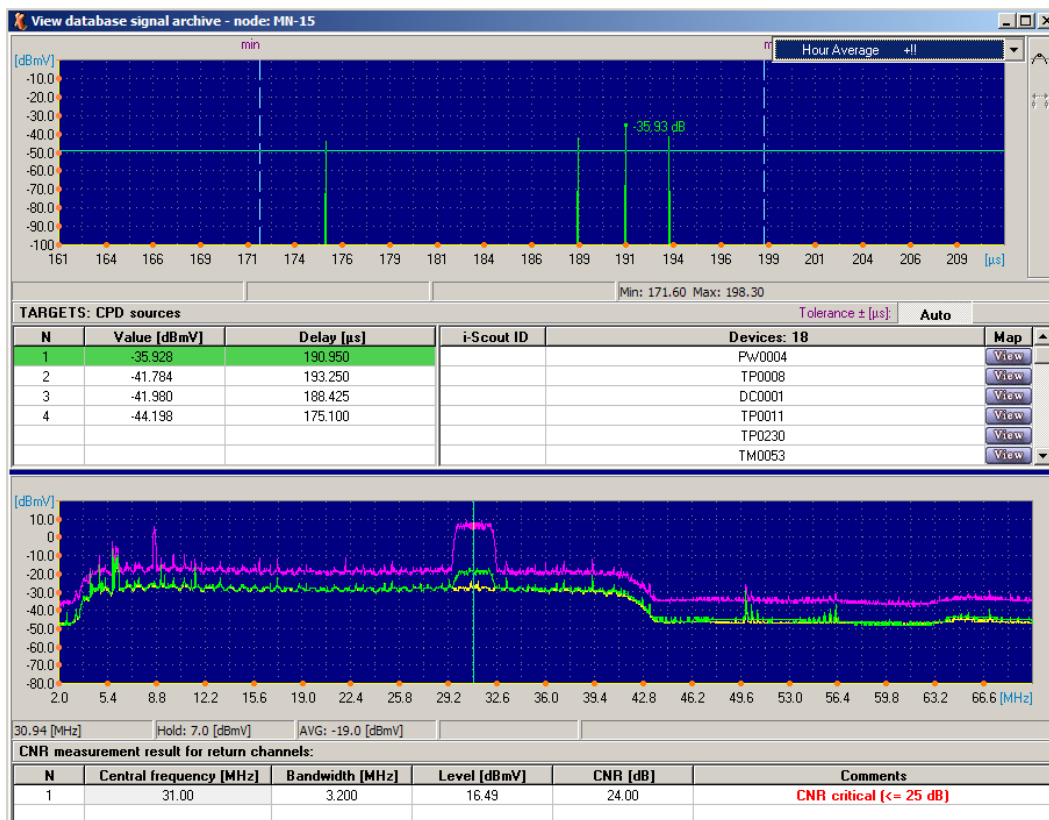
30.94 [MHz]    Hold: -3.0 [dBmV]    AVG: -27.0 [dBmV]

## Hour Average records

The Hour Average record located at the very bottom of the signal record list will show results of accumulated signal analysis and detected CPD. To open the Hour Average record select the file listed at the bottom of the pull down window:



Click on the Hour Average filename and the following screen will appear showing the CPD and spectrum detection result from analyzing data accumulated over the last hour. The spectrum data is created using max hold and average signal records stored during the last hour:



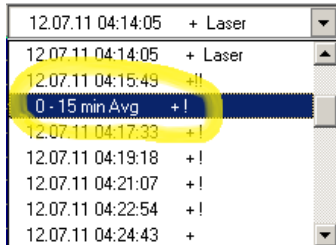
## 15min. spectrum digest

During each 15min period of node scanning, all available signal records are combined and assembled into a form that helps with return path spectrum planning by seeing how noisy the spectrum is over a longer time horizon. The max hold spectrum and the

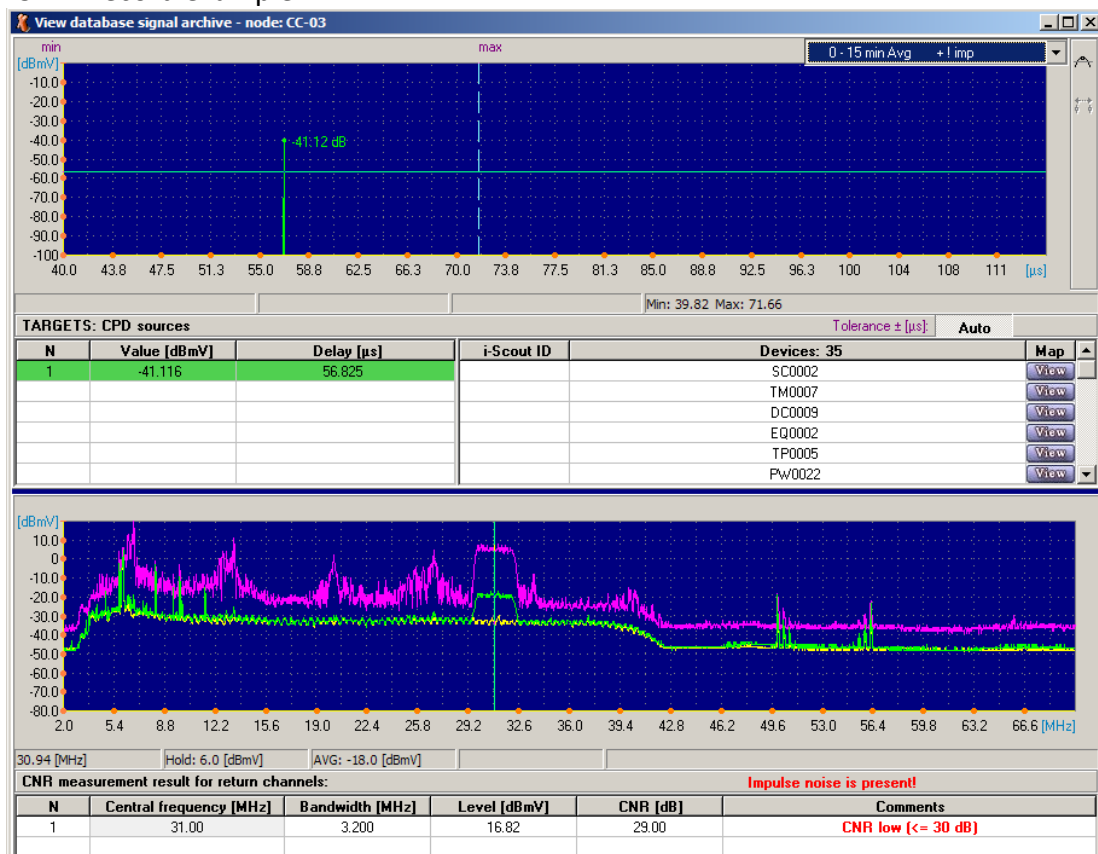


average spectrum data is used. Any impairment that occurs in each 15min period will be reflected in the 15 min average plot.

That record can be accessed by clicking the signal record filename on the drop down list:



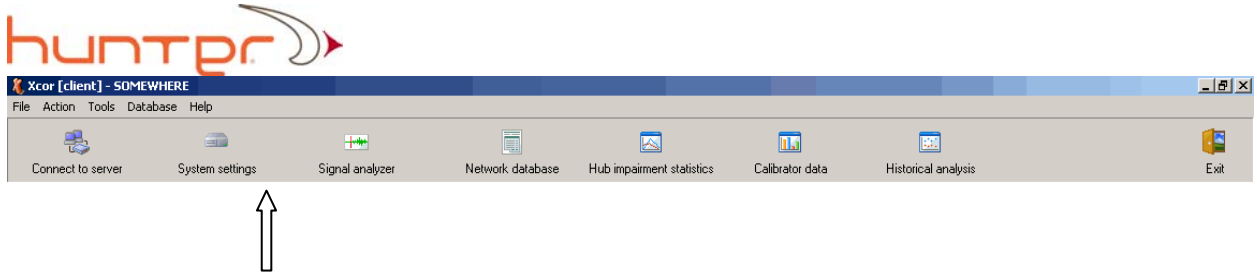
15min record example:



Signal analyzer mode







In the Signal analyzer mode you can use the CPD radar and the spectrum analyzer to watch live signals from a selected node. Advanced users can review fine details of CPD and return path signals.

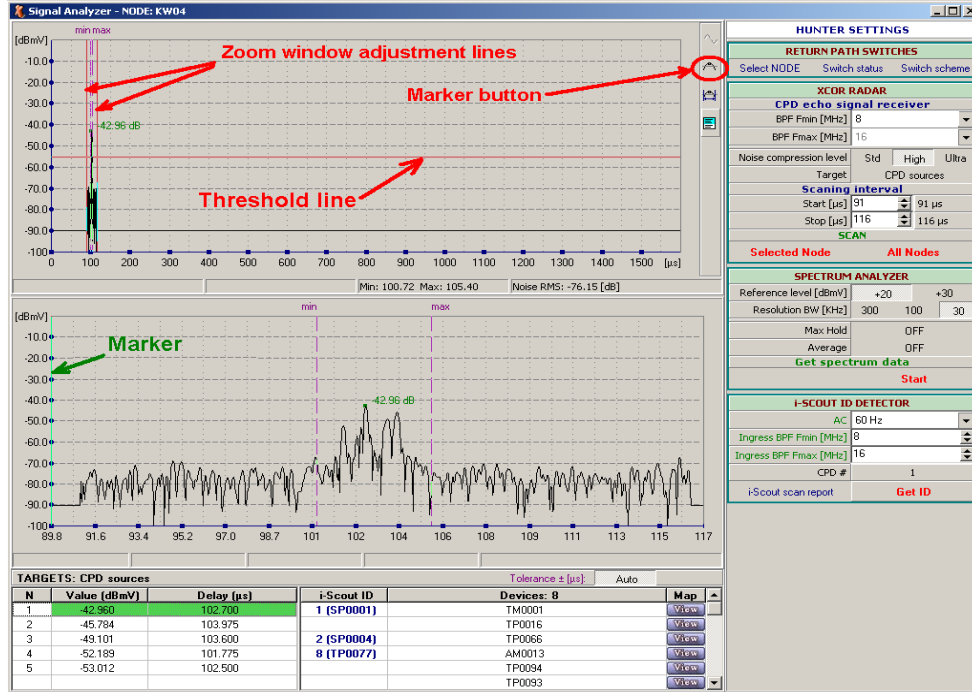
Using the CPD Signal analyzer view is significantly different than typical Xcor Hunter operation. During normal system operation, the CPD signals are saved into a database in simplified form. Smaller CPD signals which are below the threshold setting will not be shown in the database record. The Signal analyzer view is not dependent upon any threshold levels. On occasion and in certain situations for advanced users, it is desirable to view signals without thresholds.

The Signal analyzer mode should be used for special cases only and not as a standard procedure, because by activating the Signal analyzer mode the system stops regular node scanning and focuses only on the manual operation.

### **Watching live CPD signals in Signal analyzer mode**

This section describes how to use the manual mode tool. Some features are used only during system installation and troubleshooting. Detailed descriptions are available for the button functions for each screen via the F1 key.

Start the Signal analyzer mode by clicking on the Signal analyzer icon. The Signal Analyzer screen will open and will contain controls and response windows:



This mode is very helpful in viewing the working parameters for the Radar at the system installation. The signals can be viewed for a select number of nodes and based on the visible cross-correlation function “noise floor”, the fastest and most reliable CPD detection settings can be defined. Please note that the FSK transmitter parameters cannot be changed from the XCOR Client program.

In order to view a CPD signal in a particular node you must first select the desired node number from the list.

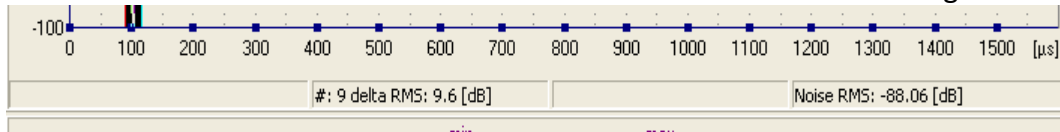
Press Select NODE button located in the RETURN PATH SWITCHES section in the right upper corner of the screen. A small window with a list of node IDs will open.

Select the desired node ID and confirm the selection by clicking OK. The system will be ready to view the selected node and the node ID will be displayed in the window title. To analyze the CPD, you must choose the target type of the signal.

In the XCOR RADAR section select CPD sources in the row next to Target. The other possible selection is Calibrator. When Target is set to Calibrator, the system will recognize the signals sent by the Quiver calibrator ONLY.



Select Noise compression level. Selections available are Standard High and Ultra. The Standard and High setting allows for faster scanning and can be used when the CPD signals are clearly visible above the noise. If the return path signal has lots of noise and jamming carriers in the 10MHz area, use the Ultra noise compression level. This setting will result in collecting signals sample by sample and accumulating results such that the Hunter noise floor is lowered thereby making lower level CPD sources visible.. The number of samples taken and accumulated in the process is displayed below the upper CPD




If the signal spectrum within 8-12MHz range is affected by CW carrier like distortions then you may use the narrower CPD echo receiver filter. The filter settings can be


XCOR RADAR	
CPD echo signal receiver	
BPF Fmin [MHz]	12
BPF Fmax [MHz]	16

selected here: . Only the lower filter frequency slope can be switched. The upper frequency is fixed.

Click on the Selected node button in the SCAN screen part of the XCOR RADAR section. That action will start the node scanning process and the button will change its view to Stop scanning. This process can be very quick if the node was calibrated or can take up to 12 seconds if the node was not calibrated and scanning intervals are set to the widest range. The scanning progress is shown by an expanding horizontal blue block bar in the left side of the screen in the vertical center. Each finalized scan will refresh the screen with a new graph of the signal. The upper portion of the window shows the CPD signal shape and position in time delay domain. In normal operation the system scans for CPD signals only within the expected coax cable part of the node. The coax portion of time delay is defined on the upper screen as an area limited with violet vertical dotted lines. There are also two red vertical lines setting the zoom area - which is then displayed in the lower screen. The zoom function allows for watching fine signal details, as multiple CPDs may not be well defined on the upper screen. The red horizontal lines can be dragged with the mouse and the zoom area can be changed. Before changing the zoom, stop scanning by pressing the Stop scanning button. You can also measure time delay to the CPD sources by using the CPD marker button. In order to use that marker, stop scanning and move the red horizontal threshold line below the peak of the desired CPD signal. Make sure you do not put it too low to avoid noise peaks being read as CPD signals. The CPD signals are the peaks which reoccur in the same place during several scans. After

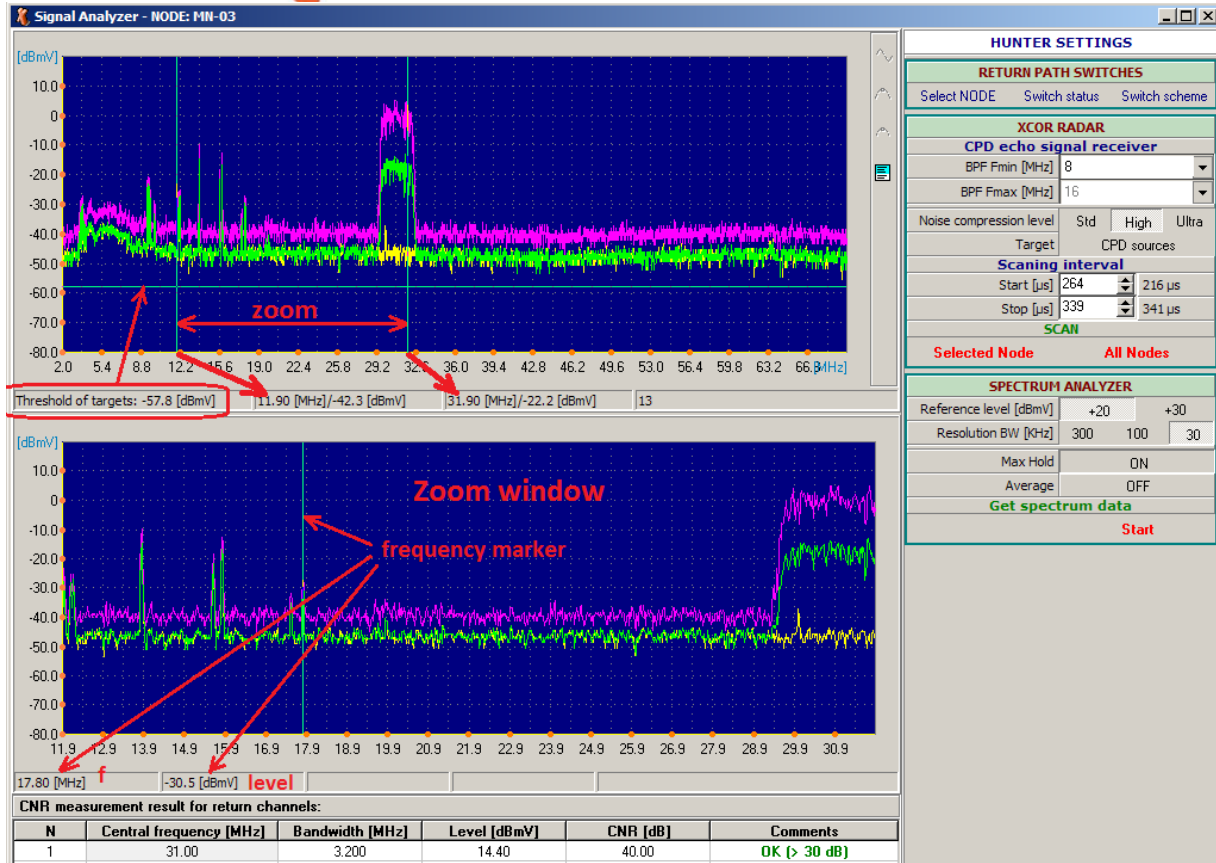


adjusting the red vertical marker line, click the Marker button - . This action will display the list of the targets in the bottom part of the screen. The time delay to each target and its signal level will be displayed. This information then can be saved as a screenshot for further use, for example as comparison with the signal shape after the problem gets fixed.

Another marker icon -  activates the marker in the zoom window only.

### **Viewing return signal spectrum using Signal analyzer mode for a single node**

The Spectrum analyzer feature can be used in Xcor systems with the Xplor feature activated. The stand alone RUA radar-spectrum analyzer employs a digital real time spectrum analyzer working in the frequency range of 2-70MHz or 2-120 MHz. It offers three resolution bandwidths: 30, 100 and 300kHz. It shows 2048 points of the signal spectrum, works fast enough to show TDMA pulses, and has Max Hold. Live signal, Average and noise under QAM plot functions. Two reference levels of +20 and +30dB can be used to match for available signal levels. It additionally measures CNR for each data carrier in the return.



To view the return path signal in a particular node you have to select the desired node number from the list first.

Press the Select NODE button located in the RETURN PATH SWITCHES section in the right upper corner of the screen. A small window with list of node IDs will open, select the desired node ID and confirm selection by clicking OK. The system will be ready to view the selected node and its ID will be displayed in the window title.

To see the actual signal, click on the Start button located in the right bottom corner of the Spectrum analyzer part of the screen. This button will become the Stop button once active. The system will start getting data and displaying spectrum view in two sub-windows. The upper window shows the full bandwidth and the lower window is the zoom area. In the lower window the system will display the frequency range limited by two vertical red lines. The frequency range can be adjusted by dragging the red lines with the mouse. The Max Hold and Average functions can be turned on and off while the screen is being refreshed. The CNR measurement results are displayed for each scan along with alarm messages for low and critical CNR values. When pulse noise or laser clipping is present, an indicator message will be displayed. The screen refreshing rate



depends on connection speed between the server and Client program. The window can only be closed after clicking the Stop button.

### Ingress alarms in Xcor with CNR feature active

The ingress that is affecting transmission of the data signals is detected using the CNR alarm feature therefore there is need to exclusively monitor for ingress

### i-Scout detection in manual mode

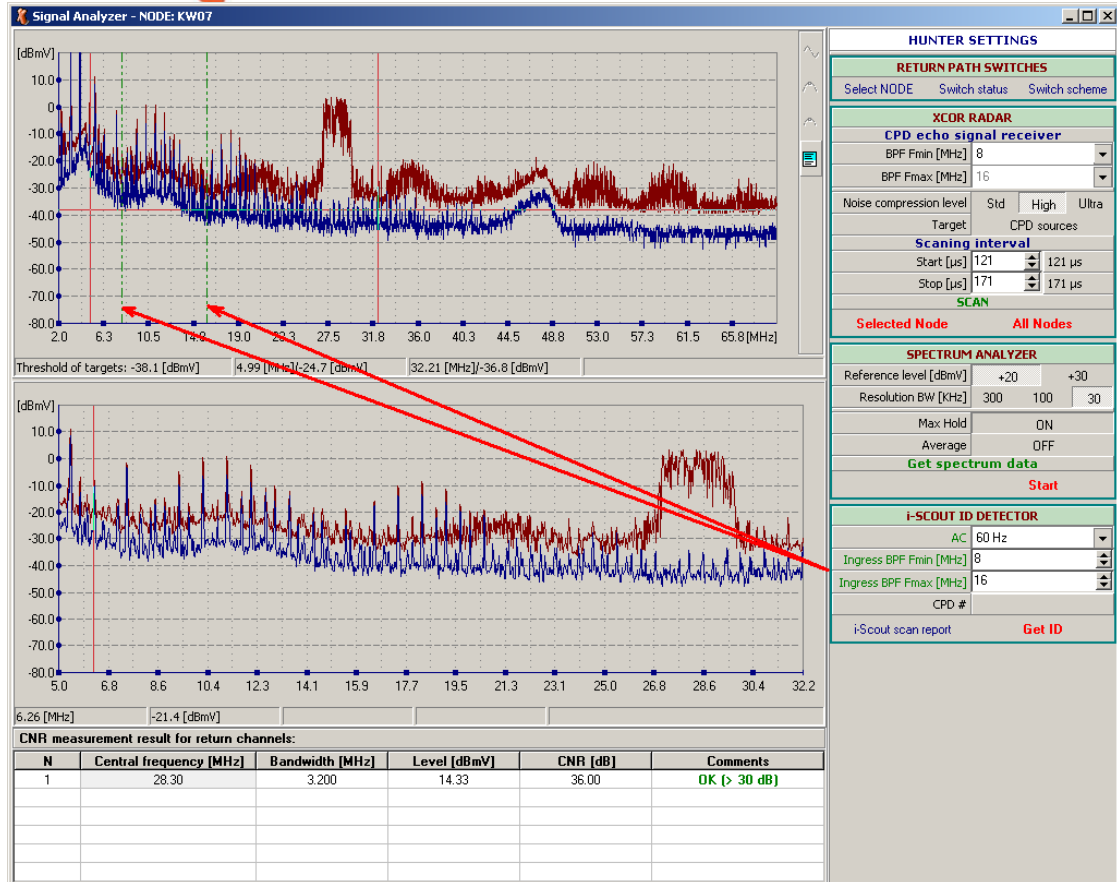
The signal analyzer allows for manual i-Scout detection. The i-Scout ID Detector appears on the Signal Analyzer menu only for nodes with installed i-Scouts. There are two possible detector options. One option is for scanning for ingress detection only and the second is scanning for CPD and ingress simultaneously.

In order to make scanning possible, set proper AC frequency first. Two settings are possible: 50 and 60Hz:

I-SCOUT ID DETECTOR	
AC	60 Hz
Ingress BPF Fmin [MHz]	8
Ingress BPF Fmax [MHz]	16
CPD #	1
Get ID	

The next step is to select the bandwidth of the detector BFP. The band pass filter. The filter min. bandwidth can be set to 1MHz. Depending on which part of the spectrum we are interested in the start and stop frequencies we set accordingly.

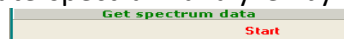
Settings example:



## Scanning i-Scout ID for ingress narrow zone

In order to activate ingress i-Scout ID detection the AC frequency. After setting these parameters follow the next steps:

1. Activate spectrum analyzer by clicking on Start button located in Get spectrum data section:



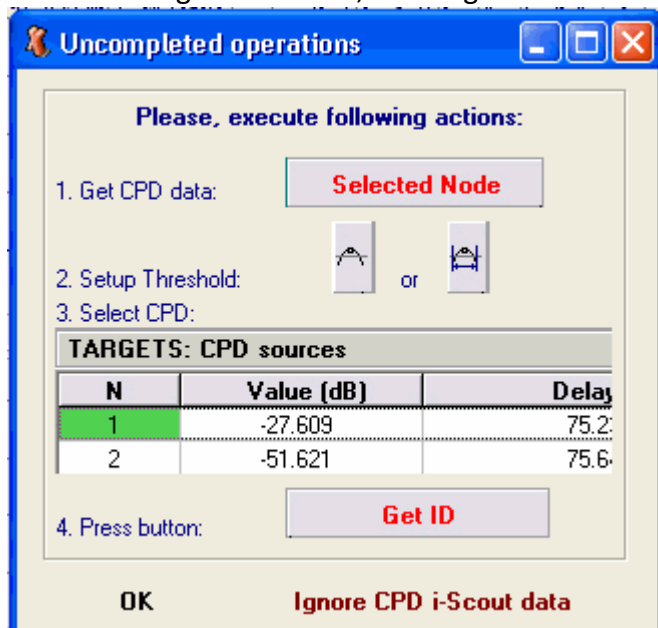
2. View spectrum and select the bandwidth portion where you will look for ingress by adjusting ingress BPF min and max in the i-Scout detector window:

i-SCOUT ID DETECTOR	
AC	60 Hz
Ingress BPF Fmin [MHz]	8
Ingress BPF Fmax [MHz]	16
CPD #	
i-Scout scan report	Get ID

Two vertical dotted green lines will reflect actual frequency setting on the spectrum plot.



3. Click on Get ID button in the same window.
4. After seeing this window, select Ignore CPD i-Scout data:



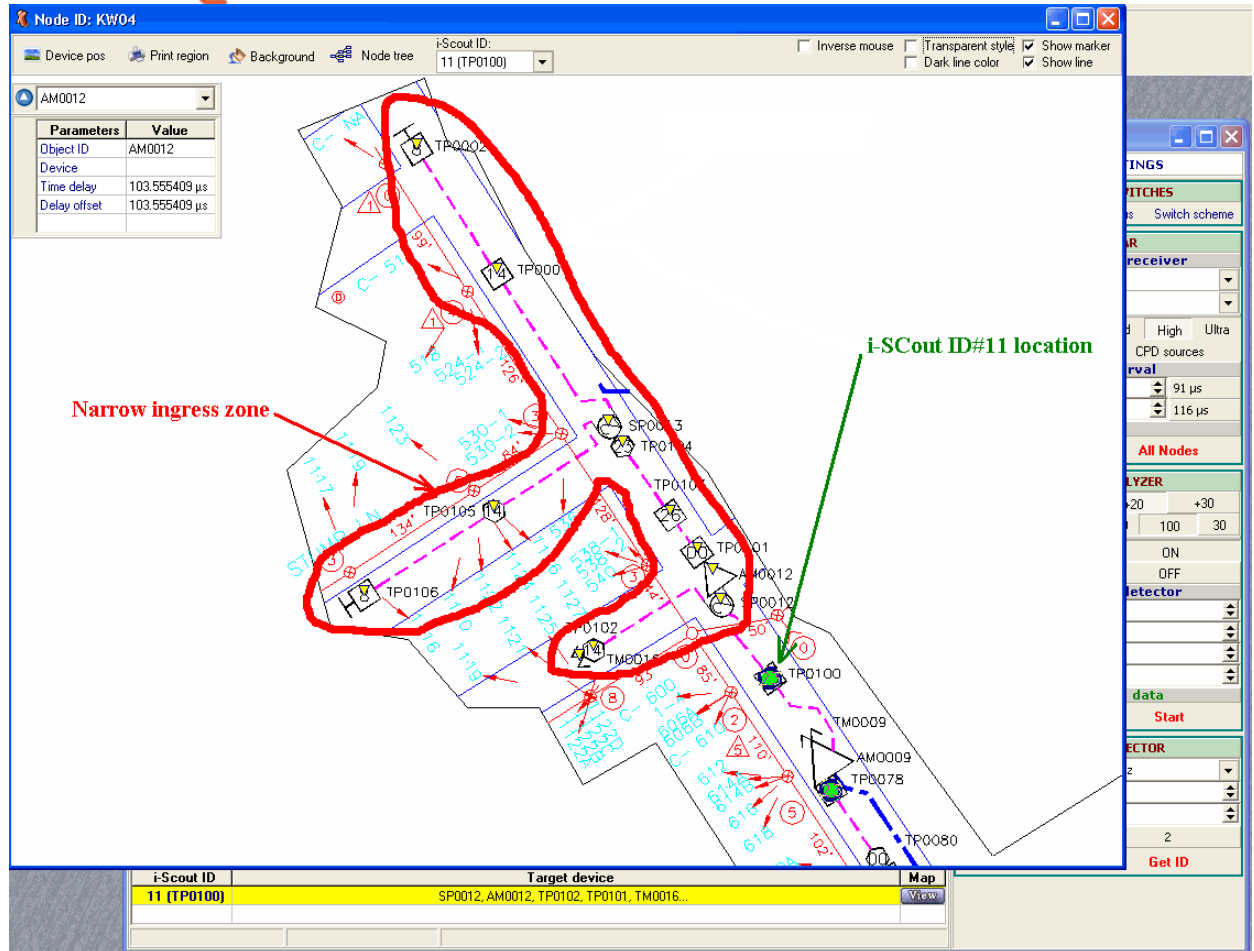
The system will start analyzing signals. The process can take up to 150 seconds and please wait until it finishes as only the final data is valid. Processing progress is indicated in the screen by an expanding blue bar.

5. After the scan is finished click on the Map View button below the report screen:

i-Scout ID	Target device	Map
11 (TP0100)	SP0012, AM0012, TP0102, TP0101, TM0016...	<a href="#">View</a>

That action will display on the screen a narrow ingress zone map section:

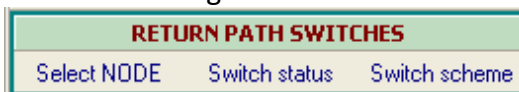




The devices marked with small yellow triangles are those which may be the ingress door. Further search process should be conducted with use of a leakage detector within predefined zone or by using spectrum analyzer. The map part can be printed for in field work.

### Scanning i-Scout ID for narrow CPD zone search

1. Select desired node for scanning using Select node button in return path switches part of Hunter settings section:



2. Set required parameters of the CPD echo receiver first:



XCOR RADAR	
CPD echo signal receiver	
BPF Fmin [MHz]	12
BPF Fmax [MHz]	16
Noise compression level	Std High Ultra
Target	CPD sources

The BPF bandpass filter has switchable Fmin frequency, set it to desired bandwidth to reduce influence of CW disturbing carriers in the area between 7 and 12MHz; these carriers is still present may elevate correlator noise floor and cover CPD making it difficult to identify.

The Noise compression level has to be set High for most situations, Ultra noise compression can be used for further increase of noise cancelling allowing software for unlimited signal sample accumulation and averaging.

In the Target field the system can be set to watch CPD signals or Calibrator signals, that setting must be in CPD sources position.

3. Start scanning for CPD by clicking on Selected node in the Scan section:

SCAN	
Selected Node	All Nodes

Note that All Nodes button activation will start a single run of automatic scan and will produce a simplifier scan report. This function is used at the system start launch by the system vendor.

4. After seeing first signal samples displayed on the screen user can make decision on narrowing scanning intervals for faster signal processing. The time delays range scanned in the process can be selected by adjusting start and stop values in the scanning section:

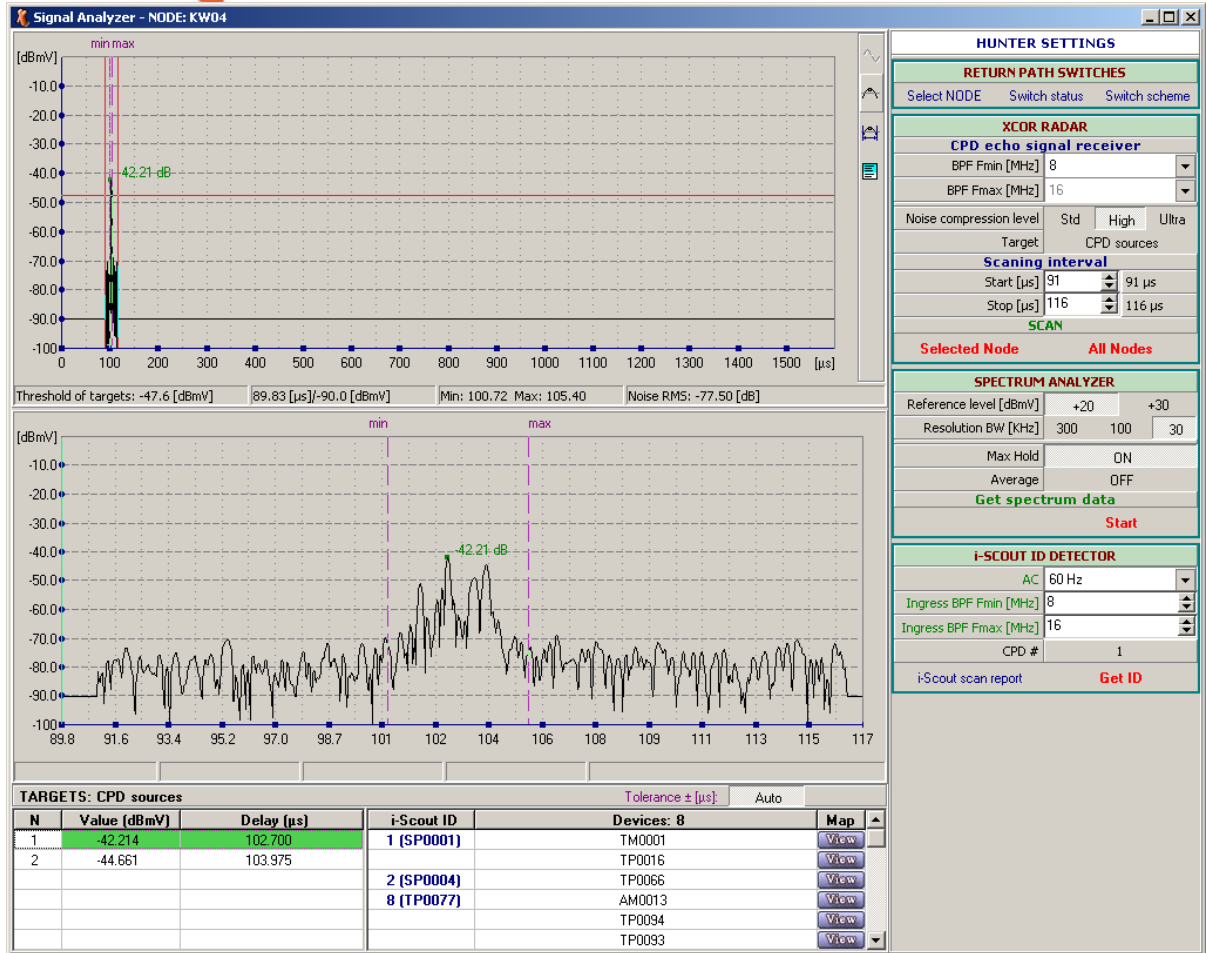
Scanning interval	
Start [μs]	91
Stop [μs]	116

The min. scanning zone width is 20 microseconds. Before changing the values stop scanning by pressing Press to Stop button:

SCAN	
Press to STOP	All Nodes

and restart it after making adjustments.

5. After receiving usable signal samples stop scanning like described above and use the marker functions to read signal parameters:



After deciding which CPD peak to trace click on the selected row in the Targets: CPD sources list in the bottom part of the screen:

TARGETS: CPD sources				
N	Value [dBmV]	Delay [μs]	i-Scout ID	
1	-42.214	102.700	1 (SP0001)	
2	-44.661	103.975	2 (SP0004)	

Chosen CPD will be highlighted green and after a couple seconds selected CPD number will be indicated in the i-Scout ID detector screen part:

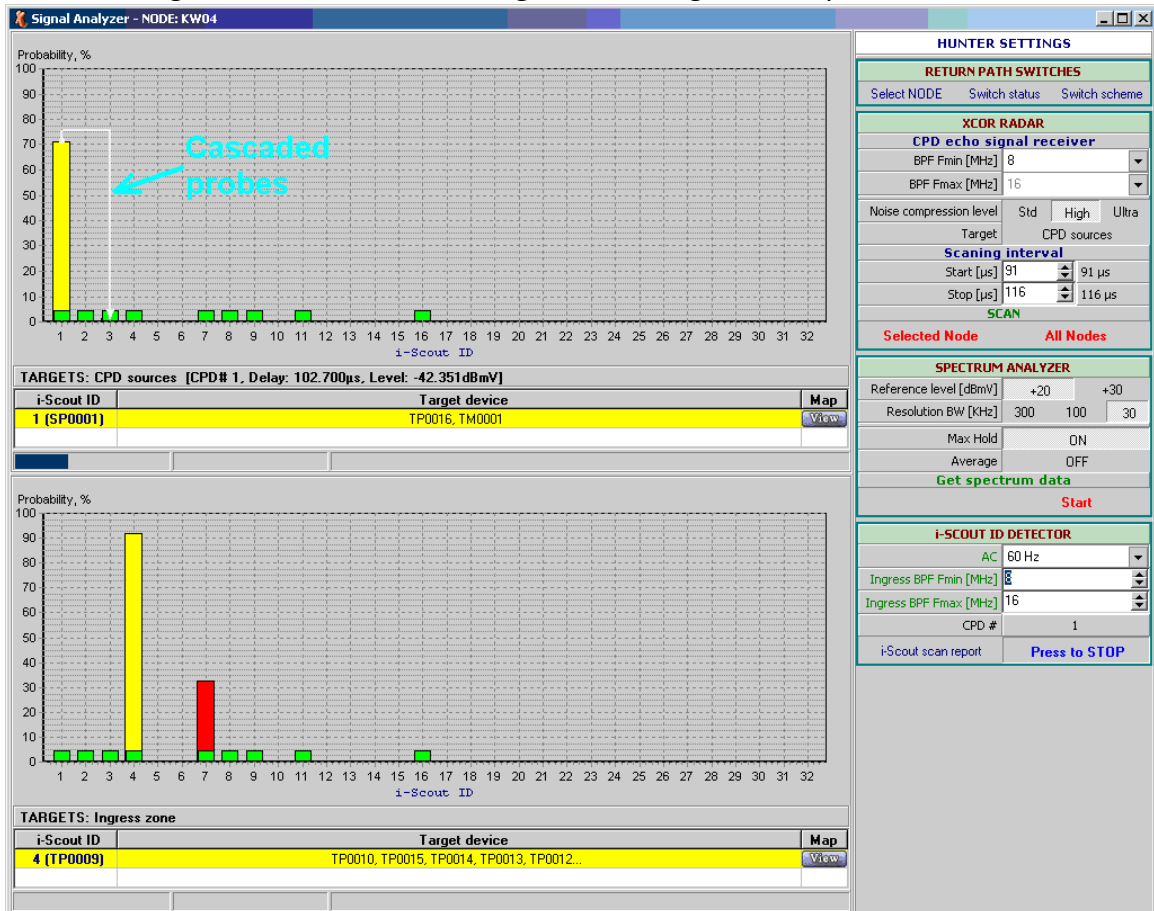
CPD #	1
i-Scout scan report	<b>Get ID</b>

6. Click Get ID button in the i-Scout ID detector screen part:



CPD #	1
i-Scout scan report	<b>Get ID</b>

That action will start the 150 second detection process. Progress can be observed on the following screen where CPD and ingress scanning action is performed:



The upper screen part reflects CPD search status while the lower portion is dedicated to ingress. Please wait until the system finishes the detection process as only the final data is valid. Processing progress is indicated on the screen by an expanding blue bar:

<b>TARGETS: CPD sources [CPD# 1.</b>	
i-Scout ID	
1 (SP0001)	

The screens with detection results will show dynamically the whole processing results. The X axis is for i-Scout probe IDs. There can be up to 32 i-Scout probes installed in the field. If the probe is installed in the field and that was confirmed in the database then there will be a green square located above the ID number: . Should there be a





The next step of the process will be to go into the field with the Quiver and start ranging CPD in the narrow zone. In the example above the start point should be the amplifier AM0001 as the CPD may be located right at the i-Scout installation site – device SP0001.

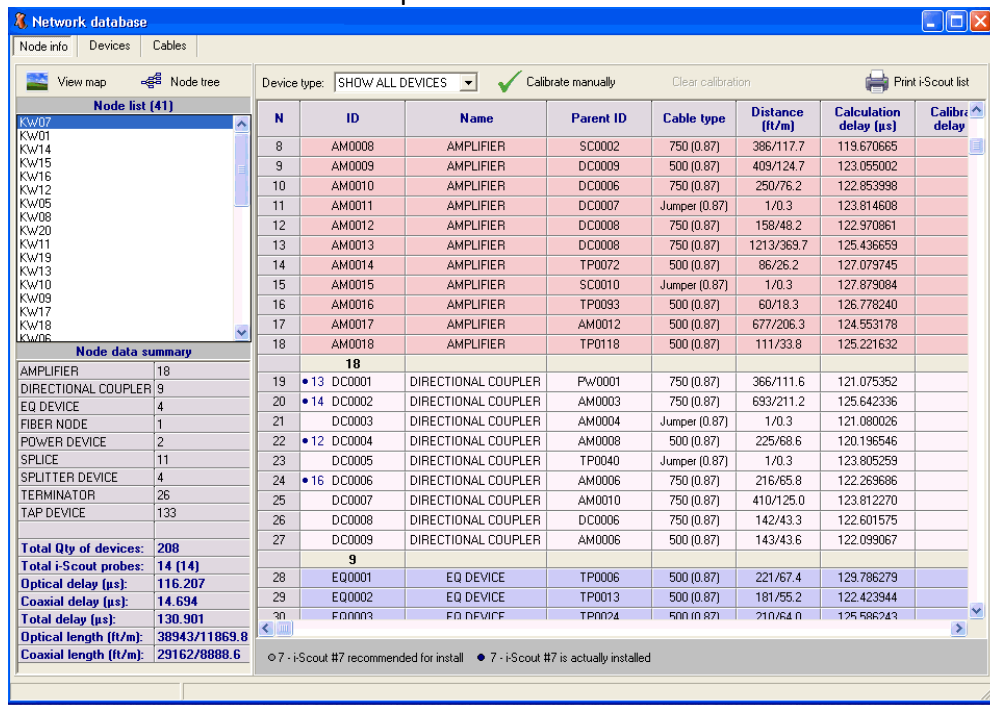
The i-Scout install sites are marked green  when the map background color is set to white.

## Network Database



The Network Database contains information on the devices contained within the network, information on parent child relationship between devices, and information on time delay. This information is used by the Quiver Navigator to point out the location of candidate devices in the field. The only data contained within this database that a user needs to access through the Xcor Client is the Node tree information and printing of the i-Scout list. The node tree information shows how the devices are connected together in a schematic diagram.

Network database screen example:



N	ID	Name	Parent ID	Cable type	Distance (ft/m)	Calculation delay (us)	Calibr. delay
8	AM0008	AMPLIFIER	SC0002	750 (0.87)	386/117.7	119.670665	
9	AM0009	AMPLIFIER	DC0009	500 (0.87)	409/124.7	123.055002	
10	AM0010	AMPLIFIER	DC0006	750 (0.87)	250/76.2	122.853998	
11	AM0011	AMPLIFIER	DC0007	Jumper (0.87)	1/0.3	123.814608	
12	AM0012	AMPLIFIER	DC0008	750 (0.87)	158/48.2	122.970861	
13	AM0013	AMPLIFIER	DC0008	750 (0.87)	1213/369.7	125.436659	
14	AM0014	AMPLIFIER	TP0072	500 (0.87)	86/26.2	127.079745	
15	AM0015	AMPLIFIER	SC0010	Jumper (0.87)	1/0.3	127.879084	
16	AM0016	AMPLIFIER	TP0093	500 (0.87)	60/18.3	126.778240	
17	AM0017	AMPLIFIER	AM0012	500 (0.87)	677/206.3	124.553178	
18	AM0018	AMPLIFIER	TP0118	500 (0.87)	111/33.8	125.221632	
<b>18</b>							
19	•13 DC0001	DIRECTIONAL COUPLER	PW0001	750 (0.87)	366/111.6	121.075352	
20	•14 DC0002	DIRECTIONAL COUPLER	AM0003	750 (0.87)	693/211.2	125.642336	
21	DC0003	DIRECTIONAL COUPLER	AM0004	Jumper (0.87)	1/0.3	121.080026	
22	•12 DC0004	DIRECTIONAL COUPLER	AM0008	500 (0.87)	225/68.6	120.196546	
23	DC0005	DIRECTIONAL COUPLER	TP0040	Jumper (0.87)	1/0.3	123.805259	
24	•16 DC0006	DIRECTIONAL COUPLER	AM0006	750 (0.87)	216/65.8	122.263686	
25	DC0007	DIRECTIONAL COUPLER	AM0010	750 (0.87)	410/125.0	123.812270	
26	DC0008	DIRECTIONAL COUPLER	DC0006	750 (0.87)	142/43.3	122.601575	
27	DC0009	DIRECTIONAL COUPLER	AM0006	500 (0.87)	143/43.6	122.099067	
<b>9</b>							
28	EQ0001	EQ DEVICE	TP0006	500 (0.87)	221/67.4	129.786279	
29	EQ0002	EQ DEVICE	TP0013	500 (0.87)	181/55.2	122.423944	
30	EQ0003	EQ DEVICE	TP0024	500 (0.87)	210/64.0	126.588243	

Node data summary:

AMPLIFIER	18
DIRECTIONAL COUPLER	9
EQ DEVICE	4
FIBER NODE	1
POWER DEVICE	2
SPLICE	11
SPLITTER DEVICE	4
TERMINATOR	26
TAP DEVICE	133
<b>Total Qty of devices:</b>	<b>208</b>
<b>Total i-Scout probes:</b>	<b>14 (14)</b>
<b>Optical delay (us):</b>	<b>116.207</b>
<b>Coaxial delay (us):</b>	<b>14.694</b>
<b>Total delay (us):</b>	<b>130.901</b>
<b>Optical length (ft/m):</b>	<b>38943/11869.8</b>
<b>Coaxial length (ft/m):</b>	<b>29162/8888.6</b>

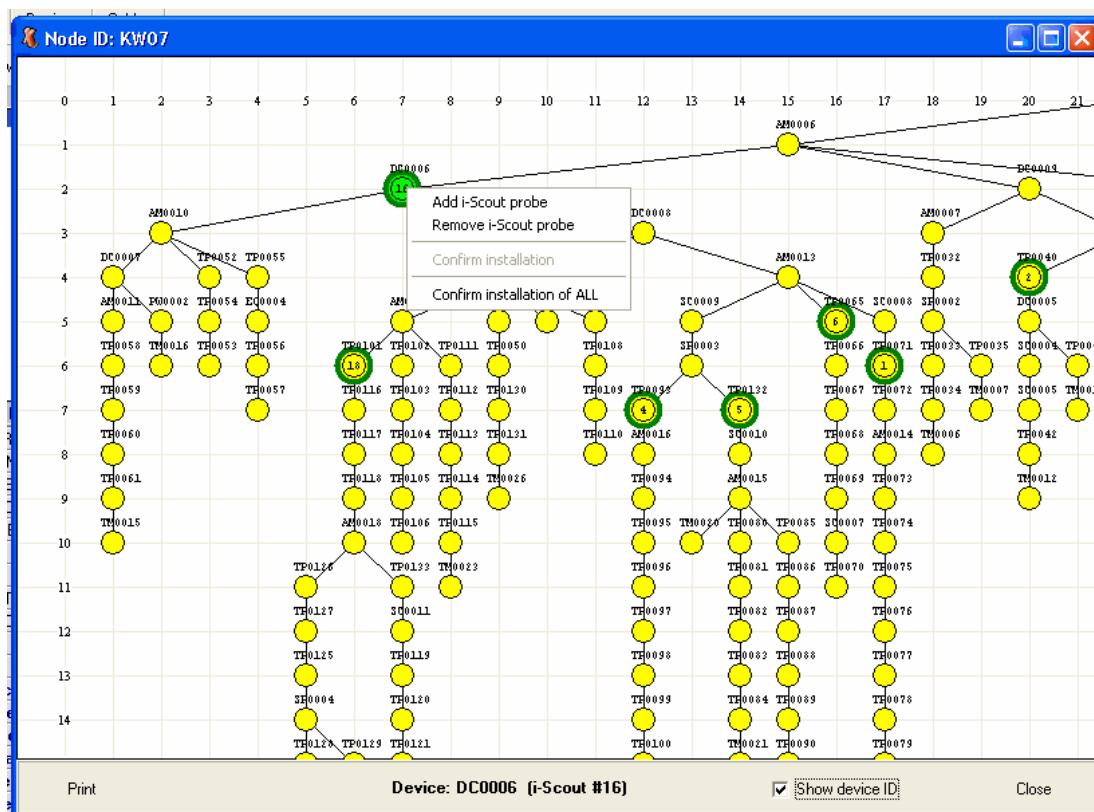
Legend: 7 - i-Scout #7 recommended for install • 7 - i-Scout #7 is actually installed




The network database for the system with i-Scout feature contains following additional information:

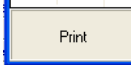
- the number of the i-Scout probes installed in a particular node: Total i-Scout probes: 14 (14)
- i-Scout probes actually installed marked with a blue dot and the probe ID number next to the device ID of actual installation of the probe: 24 • 16 DC0006
- about the probes recommended for installation, in this case the instead of a blue dot a blue ring is used
- Print i-Scout list icon Print i-Scout list allows for generating a list of locations where the i-Scout probes are installed
- Node tree icon Node tree will display simplified schematic of the node with marked i-Scout positions

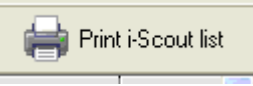
### Node tree screen example:



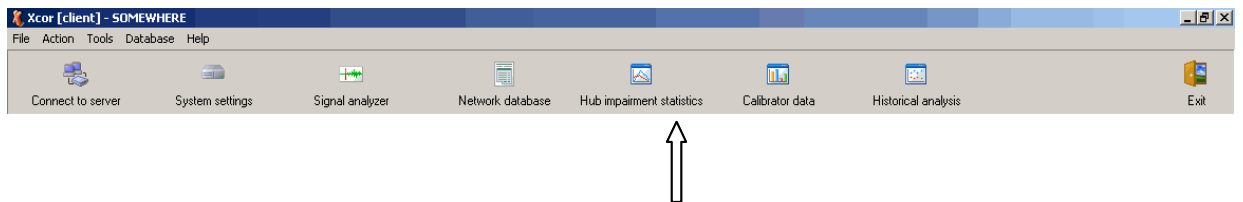


The i-Scout probe location are marked with green ring around the device where the particular probe was installed .

The node tree can be printed by pressing  in the left lower corner of the window.

The i-Scout list can be printed. In order to do this click on the  icon in the network database screen.

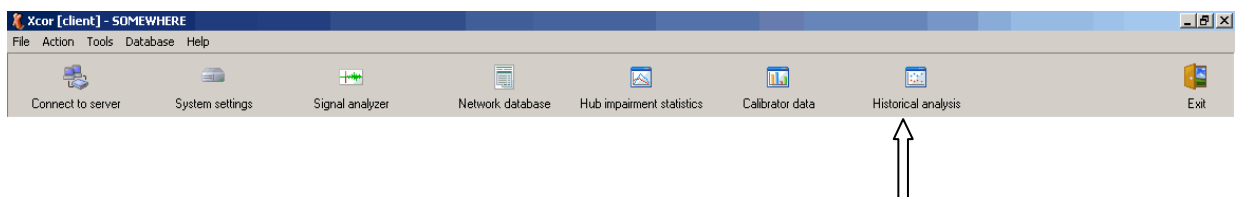
## Calibrator Data



The Calibrator data table contains time stamp information on when Quiver calibrator signals were received. Since the node calibration process is automated, there is no need for user to access this database.

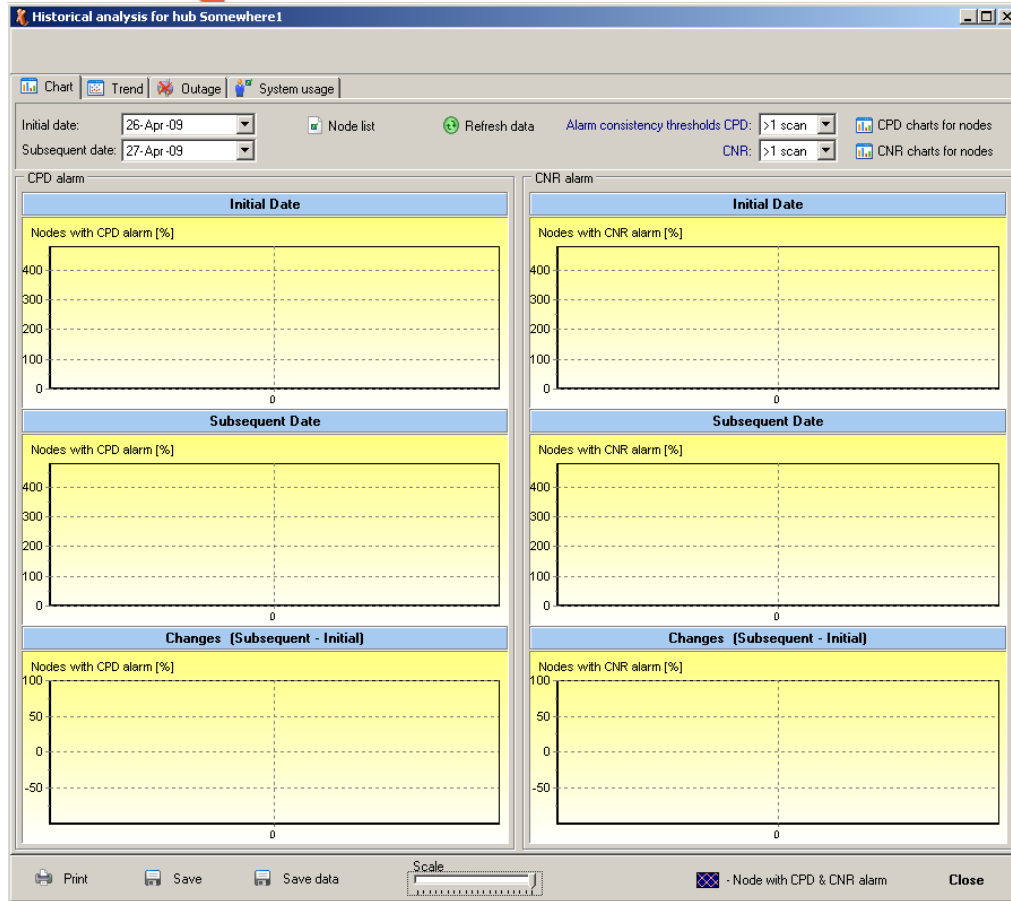
### Historical analysis

The data collected by Xcor can be arranged into easy to interpret reports. The reports can be created with the tools in the Historical analysis window:



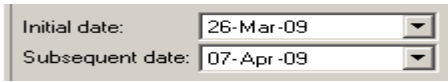
In the Historical analysis window the data can be arranged by different rules creating an overview of the system health and impairment trends.



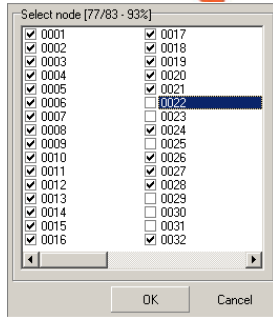


## CPD and CNR alarm node number changes Charts

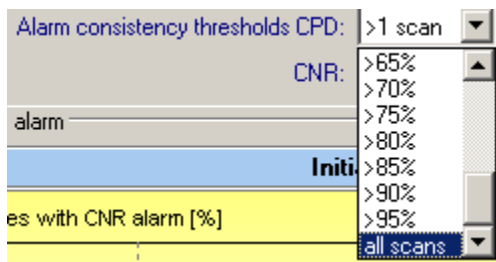
This tool shows the difference in the number of nodes affected by CPD and CNR alarms for the initial and subsequent dates for selected nodes. In order to get the Chart displayed, several parameters need to be selected first.

Select dates for status comparison here , Note: the system compares data for complete days, this way the subsequent date must be set to be different from the current date.

Select the nodes that are taken in consideration for data analysis by marking the check boxes and left click OK button:

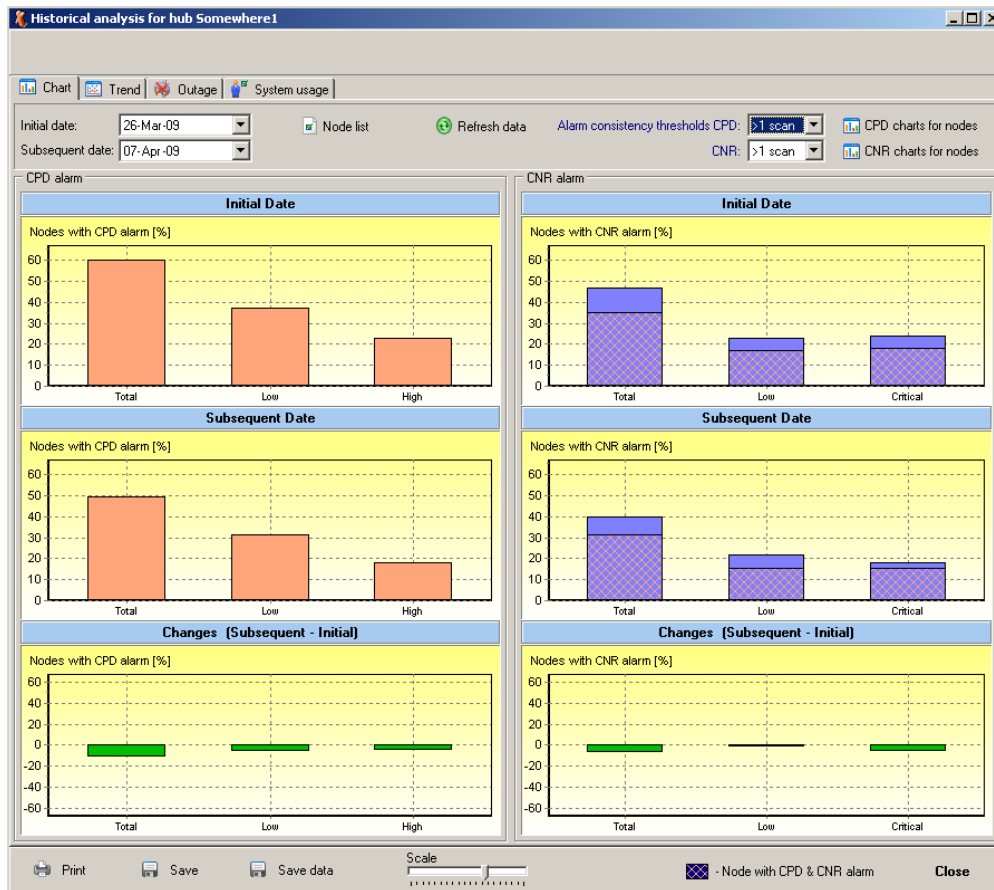


Select Alarm consistency thresholds. Only the nodes that are affected by the selected condition will be considered. Make required setting separately for CPD and CNR:



If the default setting **holds CPD: >1 scan** is used, then nodes with any CPD alarm are counted. Setting **all scans** considers only nodes with CPD present during all scans. Setting **>80%** considers only nodes with CPD present during more than 80% of scans.

The refresh button goes red **Refresh data**, when any condition is changed, left click that button to reload data for new conditions set.





Information presented on the Chart:

number of nodes with CPD alarm for the initial date


number of nodes with CPD alarm for subsequent date

change to the of number of nodes with CPD alarm between the initial and subsequent

dates; the scale can be adjusted by using  tool


the CNR chart bars include additional information about simultaneous CPD and CNR alarm presence  - Node with CPD & CNR alarm

Saving screen

The screen can be saved as WMF file by using  Save button. The date time stamp is used as a filename.

Saving data used for creating charts




The data that is used for creating this chart can be saved in a text file by using  Save data button. The date time stamp is used as a filename.

For selected dates, the CPD and CNR charts respectively are available for viewing by mouse left click on  CPD charts for nodes or  CNR charts for nodes buttons.

The CPD chart screen



The screen initially shows information sorted by the node connection order. Right click mouse button to open sorting menu then select required order.

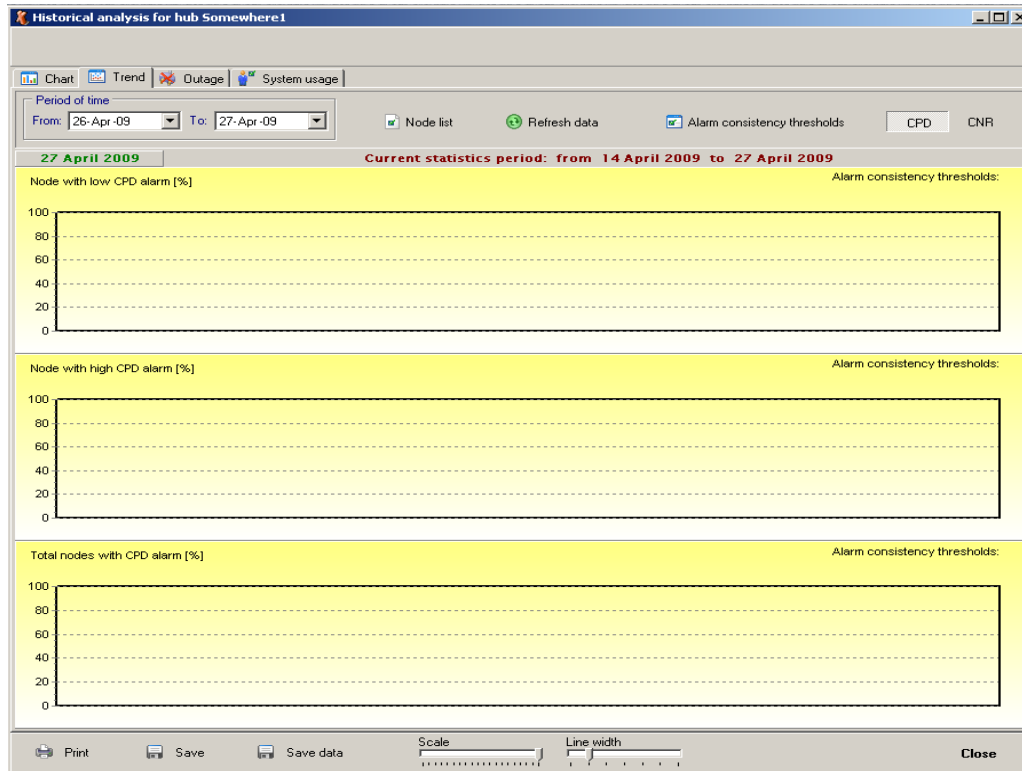
The same action can be conducted on the CNR charts by using  CNR charts for nodes button.


Trend analysis screen



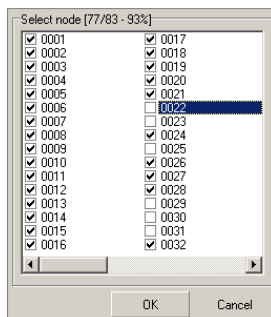
Trend analysis allows for selecting a time frame to create a CPD/CNR graph for a group of selected nodes.

Open the screen by a mouse left click on  Trend tab. The trend screen shows up:




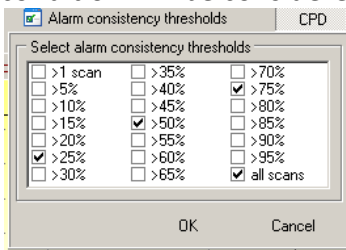
Select period of time by selecting start and stop dates .

Select the nodes that are taken in consideration for data analysis by marking the check boxes and left click OK button:






Select Alarm consistency thresholds. Only the nodes that are affected by the selected condition will be considered. Open  Alarm consistency thresholds window:



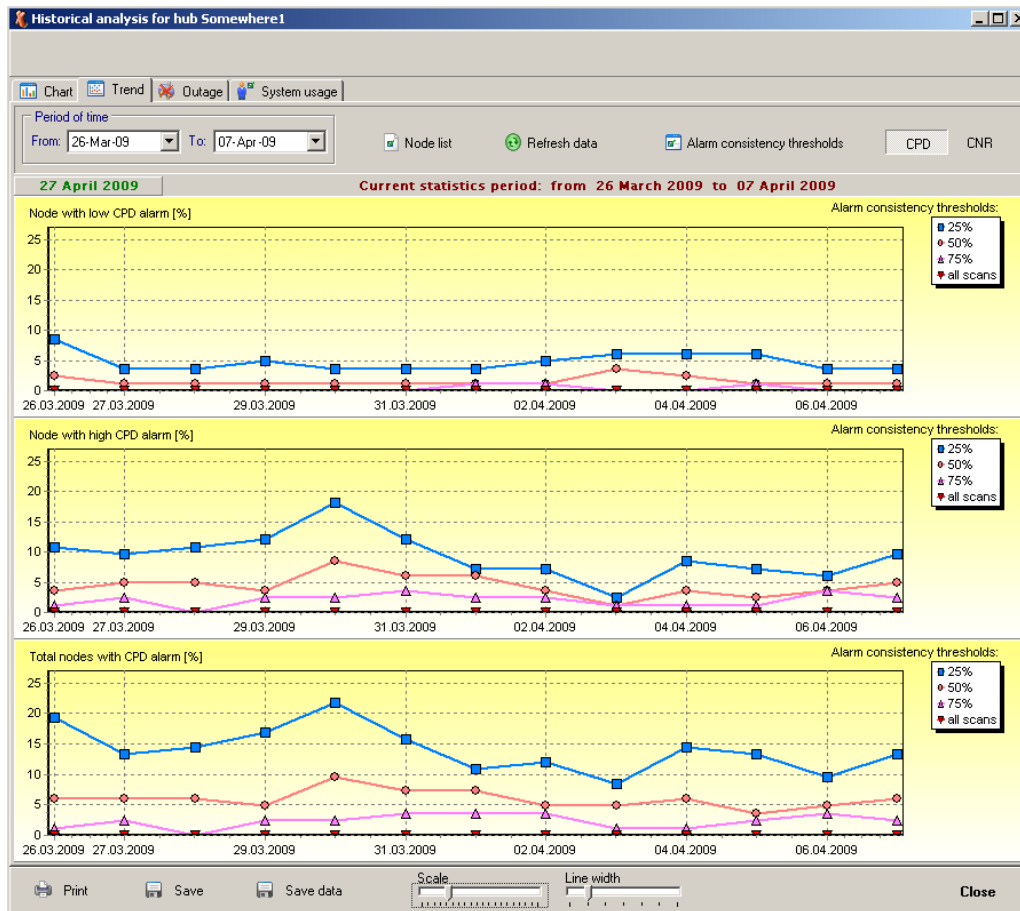
For each condition set in this window a separate curve is created. The settings mean:

- ☒ >25% ; shows nodes with impairments existing for more than 25% of scans
- ☒ >50% ; shows nodes with impairments existing for more than 50% of scans
- ☒ all scans ; shows nodes with impairments existing during all scans

The refresh button turns red  Refresh data, when any condition is changed, left click that button to reload data for new conditions.

# hunter

## Trend screen



Operator can switch between a screen showing trend for CPD and CNR by left click on

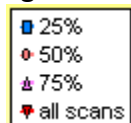
**CPD** or **CNR** button.

Note: when the curves are located below 30% of the Y axis, then use

tool to change scale to see more fine curve details. The line width can be adjusted by using

Line width tool.

Information about the lines colors and associated with them thresholds are shown on the rights side of the screen:






### Saving screen content

The screen can be saved as WMF file by using  **Save** button.

### Saving data used for creating graph

The data that is used for creating this graph can be saved in a text file by using  **Save data** button. The date time stamp is used as a filename.

## Outage alarm data presentation

Information about outages discovered is stored in the database. That information can be displayed in a table form for selected groups of nodes during the selected period.

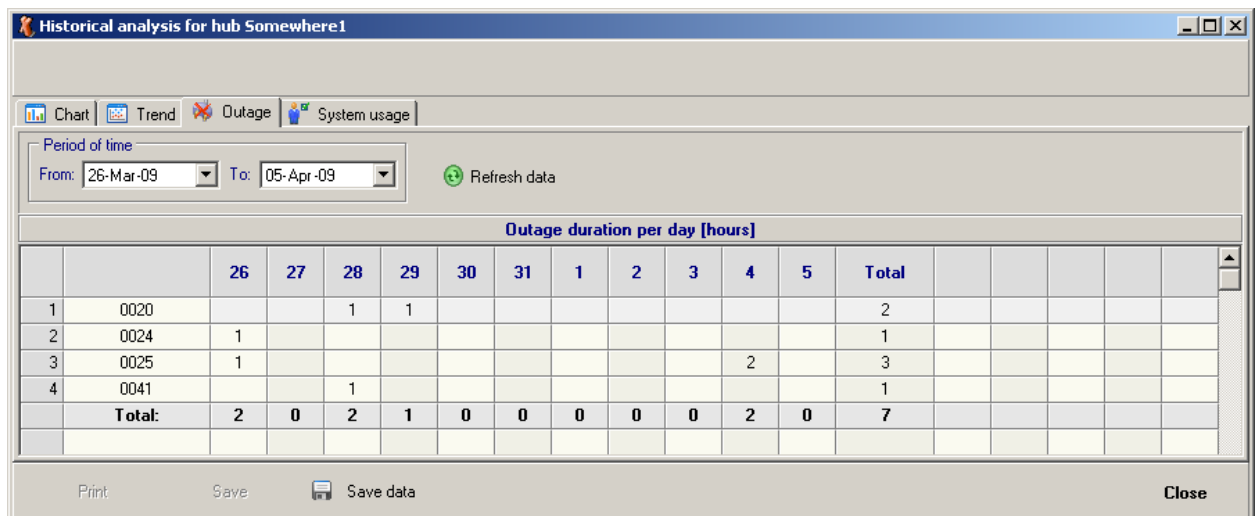
Left click the  **Outage** tab. Then set the following parameters:

Period of time  
From: 26-Mar-09 To: 05-Apr-09

Period of time by setting the start and stop dates here

Then left click  **Refresh data** to reload data.

Outage screen example:



		26	27	28	29	30	31	1	2	3	4	5	Total					
1	0020			1	1								2					
2	0024	1											1					
3	0025	1									2		3					
4	0041			1									1					
	<b>Total:</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>7</b>					

Information about the outage duration is rounded up to full hours.

Each node ID that the outage event was recorded for is listed in a second left most column and outage duration for particular days is listed in the rows.






The above data can be saved into a text file and utilized for creating reports.

## System usage info

Information about how often the Xcor is used as a tool can be visualized with the help of processed data like the number of nodes put into the short scanning schedule.

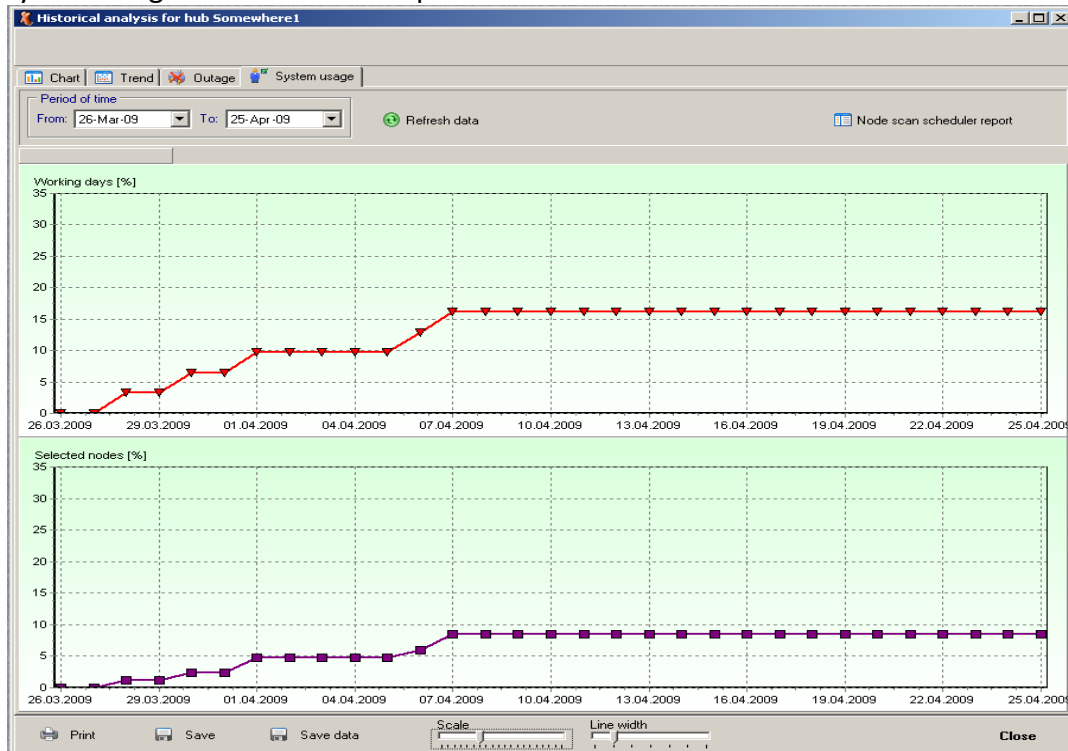
To access this information left click the  **System usage** tab.


Select period of time by selecting start and stop dates:

Period of time  
From: 26-Mar-09 To: 25-Apr-09

Then left click  **Refresh data** to reload data.

System usage data screen example:



The graphs show how intensity of system use is changing over a selected period of time. Operator can view the list of nodes that were put into scan scheduler over selected period of time. Left click the  **Node scan scheduler report** button to access the list.



## The Node scan scheduler report

**Node scan scheduler report**

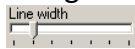
List nodes selected in scan scheduler [7/83 - 8%]

<input type="checkbox"/> 0022	<input type="checkbox"/> 0029	<input type="checkbox"/> 0036	<input type="checkbox"/> 0043	<input type="checkbox"/> 0050	<input type="checkbox"/> 0057
<input type="checkbox"/> 0023	<input type="checkbox"/> 0030	<input type="checkbox"/> 0037	<input type="checkbox"/> 0044	<input type="checkbox"/> 0051	<input type="checkbox"/> 0058
<input type="checkbox"/> 0024	<input type="checkbox"/> 0031	<input checked="" type="checkbox"/> 0038	<input type="checkbox"/> 0045	<input checked="" type="checkbox"/> 0052	<input checked="" type="checkbox"/> 0059
<input type="checkbox"/> 0025	<input type="checkbox"/> 0032	<input type="checkbox"/> 0039	<input type="checkbox"/> 0046	<input type="checkbox"/> 0053	<input type="checkbox"/> 0060
<input type="checkbox"/> 0026	<input type="checkbox"/> 0033	<input type="checkbox"/> 0040	<input type="checkbox"/> 0047	<input type="checkbox"/> 0054	<input type="checkbox"/> 0061
<input type="checkbox"/> 0027	<input type="checkbox"/> 0034	<input type="checkbox"/> 0041	<input type="checkbox"/> 0048	<input type="checkbox"/> FUTURE01	<input type="checkbox"/> 0062
<input type="checkbox"/> 0028	<input checked="" type="checkbox"/> 0035	<input type="checkbox"/> 0042	<input type="checkbox"/> 0049	<input type="checkbox"/> 0056	<input type="checkbox"/> 0063

#	Date	Selected nodes ID
1	28.03.2009	0038
2	30.03.2009	0059
3	01.04.2009	0035,0078
4	06.04.2009	0001
5	07.04.2009	0052,0065

Save data Close

Note: when the curves are located below 30% of the Y axis, then use tool to change scale to see the fine curve details. The line width can be adjusted by using



tool.