

Net-Tracker:

Software Overview



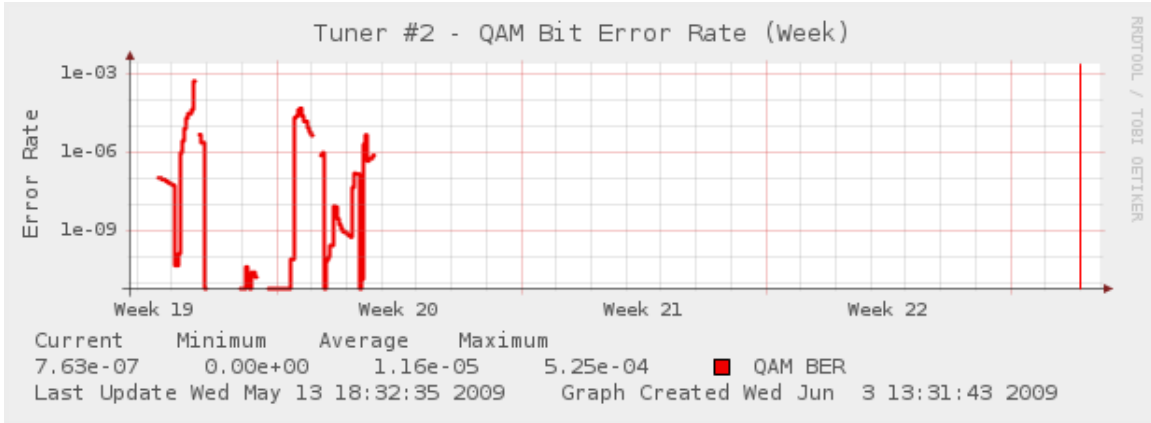
Net-Tracker is a Cable Modem, MTA and Digital Cable Box monitoring tool developed with the unique requirements of the Cable Network Analyst in mind. It allows the user to put customer and neighboring account equipment into monitoring and provides tracking of **Cable Box Signal Levels, QAM Signal Levels, QAM BER, QAM Frequency, QAM Codeword Errors** and **QAM Percent Codeword Errors**. For Modems and MTA's, it tracks **Ping Times, Signal Levels, Data Throughput, Micro-Reflections, Codeword Errors** and **Percent Codeword Errors**.

Any piece of equipment can easily be added provided you have MAC and IP Addresses for the device. Once added, Net Tracker will begin polling data. Polling intervals are currently set at five minutes for cable boxes and one minute for modems and MTA's

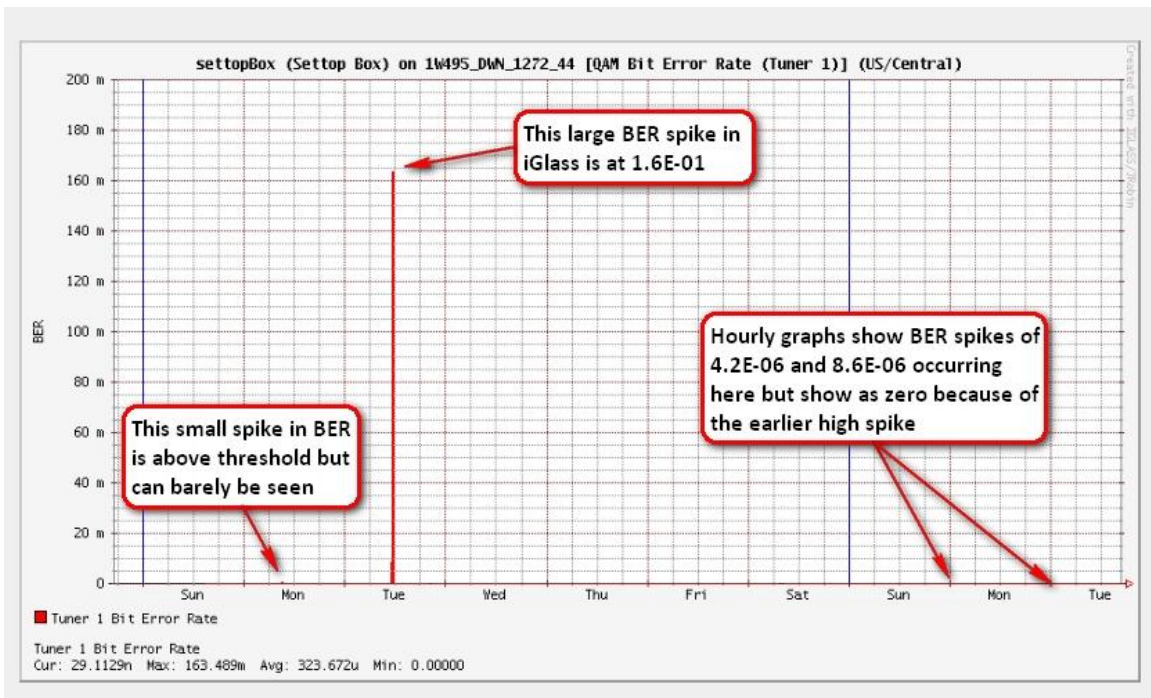
Net Tracker allows you to place any customer equipment into monitoring as well as place equipment on neighboring accounts into monitoring under the problem customer's Net-Tracker account. The key importance of this is that we are then able to put strategically situated equipment located throughout the node or segment being investigated into the tool and then compare the graphed parameters for this equipment on a single page. In this way, a user is able to compare on a single page, for example, BER of all customer Cable Boxes to the BER of Cable Boxes on neighboring accounts. Other tools force you to set up monitoring on each individual device and do not group them under one account. To compare the devices, you must manually pull up each device and insert each graph into a master Word document. Therefore what takes twenty minutes or longer to do in other tools takes only seconds in Net-Tracker.

Another key feature of Net-Tracker over other tools is the ability to view BER and CER graphs in scientific notation as opposed to decimal. Therefore when reading BER graphs, we are looking at values that are displayed in the cable industry standard notation. For example, Net-Tracker will show a bad BER reading as 3.4E-06 instead of as 3.4 μ like other tools such as iGlass do.

Just as powerful, Net-Tracker displays BER and CER graphs on a logarithmic scale instead of on a linear scale. The importance of this is that while other tools will show only one or two high peaks in errors on a graph and then nothing else, Net-Tracker will compress the scaling on the graph to not only show these high major spikes but also the smaller minor spikes. This is because with a linear data plot on a graph, lower spikes get scaled down to zero or near zero; thus not allowing us to use these smaller spikes when matching up graph patterns. The following is a sample BER graph from Net-Tracker:



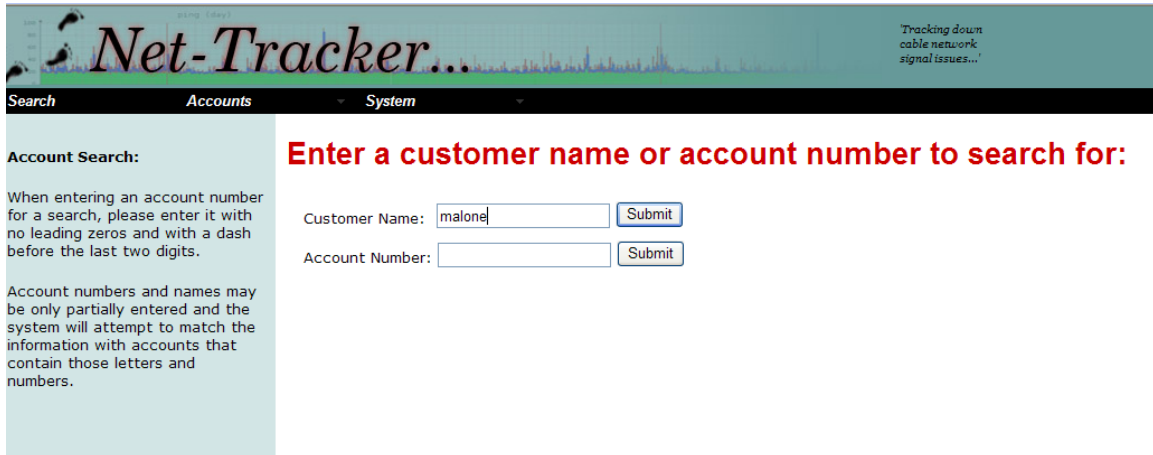
In the above graph, we can see several spikes in BER with the major one being at a maximum of 5.24E-04 and smaller ones down around 1.0E-05, 1.0E-06 and 1.0E-07. With the Net-Tracker graphs we see all these lower spikes displayed in the graph. On a linear graph such as that in iGlass or ServAssure, the higher spike would scale up to the top of the graph and the lower spikes would either be very small bumps or would not even register on the graph. Here is an example of this type of graph:



Because of the logarithmic graphs used in Net-Tracker, it is far easier to spot patterns of BER and CER than in any other tool.

Net-Tracker Use:

Use of Net-Tracker is very easy and user friendly. To pull up a customer's monitoring account, you can search by customer name or account number:



The screenshot shows the Net-Tracker web interface. At the top, there is a header with the title "Net-Tracker..." and a tagline "Tracking down cable network signal issues...!". Below the header is a navigation bar with three tabs: "Search", "Accounts", and "System". The "Search" tab is active. On the left side, there is a section titled "Account Search:" with instructions: "When entering an account number for a search, please enter it with no leading zeros and with a dash before the last two digits." and "Account numbers and names may be only partially entered and the system will attempt to match the information with accounts that contain those letters and numbers." On the right side, there is a red heading "Enter a customer name or account number to search for:" followed by two search fields. The first field is labeled "Customer Name:" and contains the text "malone", with a "Submit" button next to it. The second field is labeled "Account Number:" and is empty, with a "Submit" button next to it.

In addition to these fields, Net-Tracker has a large notes field for each customer account and also an additional notes fields for each device entered. This allows the user to put in detailed information as to not only what the customer issue is but also give specifics on each device entered. This is useful in detailing the neighboring customer name, account number and where in the node the other account is in relation to the subject account (i.e. upstream before active A06).

Once the customer or account number search is completed, it will bring up the first piece of equipment that was placed into monitoring and display the daily monitoring graphs:

Net-Tracker...
Tracking down
cable network
signal issues...

Search
Accounts
System

Account Information:

Account Number:
391193-02

Customer Name:
SHELLEY K PERRY

Node:
3K048

Comments:
Intermittent dial tone

Current Device Info:

Device Description:
Customer MTA

Device Type:
Motorola 5100

IP Address:
76.34.201.244

MAC Address:
0015CE890A6E

Select a Different Device:
Select a Device

Select a Different Display Option:
Data Display Options

Edit Account:

Customer Monitoring Results For The Last Day:

(Motorola 5100 - Customer MTA)

Modem Ping Times (Day)

Current	Minimum	Average	Maximum
25.66	18.09	35.61	325.77
19.53	14.87	18.62	219.55
17.79	13.39	19.66	176.58

Last Update Wed Jun 3 13:59:56 2009 Graph Created Wed Jun 3 14:00:06 2009

Modem Signal Levels (Day)

Current	Minimum	Average	Maximum
38.00	38.00	38.00	38.00
8.39	7.31	9.07	10.90
35.54	34.77	35.38	36.10

Last Update Wed Jun 3 13:59:55 2009 Graph Created Wed Jun 3 14:00:06 2009

Modem Throughput (Day)

Current	Minimum	Average	Maximum
393	369	406	698
1	0	3	94

Last Update Wed Jun 3 13:59:55 2009 Graph Created Wed Jun 3 14:00:06 2009

Modem Microreflections (Day)

Current	Minimum	Average	Maximum
59.92	49.06	66.72	84.99

Last Update Wed Jun 3 13:59:55 2009 Graph Created Wed Jun 3 14:00:07 2009

Modem Codeword Errors (Day)

Current	Minimum	Average	Maximum
0	0	0	10
0	0	0	0

Last Update Wed Jun 3 13:59:56 2009 Graph Created Wed Jun 3 14:00:07 2009

Modem Percent Codeword Errors (Day)

Current	Minimum	Average	Maximum
0.000000	0.000000	0.000000	0.000361
0.000000	0.000000	0.000000	0.000000

Last Update Wed Jun 3 13:59:56 2009 Graph Created Wed Jun 3 14:00:07 2009

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By clicking on any of the daily graphs, it will bring up historical graphs for that data. These additional graphs show two-day, weekly, monthly and yearly monitoring results:

Net-Tracker...

"Tracking down cable network signal issues"

Search
Accounts
System

Account Information:

Account Number:
391193-02

Customer Name:
SHELLEY K PERRY

Node:
3K048

Comments:
Intermittent dial tone

Current Device Info:

Device Description:
Customer MTA

Device Type:
Motorola 5100

IP Address:
76.34.201.244

MAC Address:
0015CE890A6E

Select a Different Device:

Select a Different Display Option:

Edit Account:

Customer Monitoring Historical Results:

Modem Signal Levels (2-Day)

Current	Minimum	Average	Maximum
38.00	38.00	38.21	40.00
8.37	7.17	8.93	10.73
35.57	34.75	35.36	36.15

Last Update Wed Jun 3 14:02:55 2009 Graph Created Wed Jun 3 14:03:14 2009

Modem Signal Levels (Week)

Current	Minimum	Average	Maximum
38.00	38.00	38.33	40.00
8.30	6.99	8.73	10.32
35.46	34.61	35.31	36.09

Last Update Wed Jun 3 14:02:55 2009 Graph Created Wed Jun 3 14:03:14 2009

Modem Signal Levels (Month)

Current	Minimum	Average	Maximum
38.00	38.00	38.67	40.00
8.05	4.65	8.34	10.79
35.25	34.76	35.36	36.31

Last Update Wed Jun 3 14:02:55 2009 Graph Created Wed Jun 3 14:03:14 2009

Modem Signal Levels (Year)

Current	Minimum	Average	Maximum
38.00	38.00	38.68	39.50
9.29	5.68	8.32	9.48
35.40	35.07	35.36	35.83

Last Update Wed Jun 3 14:02:55 2009 Graph Created Wed Jun 3 14:03:14 2009

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All the equipment being monitored under this customer account (whether the actual customer's equipment or that of a neighboring account) is located in a drop down list which allows you to select a specific box or modem to look at monitoring graphs for:

Customer Monitoring Results For The Last Day.

(SA8300D - HD 8300)

Account Information:

Account Number: 17321902
 Customer Name: Malone
 Node: 1X048
 Comments: ongoing video issues

Current Device Info:

Device Description: HD 8300
 Device Type: SA8300D
 IP Address: 10.6.10.213
 MAC Address: 001Ac3392997

Select a Different Device:

Select a Device [Go]
 Select a Device
 HD 8300
 downstream EOL 17260806
 downstream 20310201
 emta #1369162
 hsd only #1369162
 downstream 17263306 5007 N
 downstream EOL 17260806 48
 downstream 20310201 4856 N

Add Device
 Edit Device
 Delete Device

Cable Box Signal Levels (Day)

Current	Minimum	Average	Maximum
33.91	33.00	34.30	39.05

Legend: Reverse Level (dBmV), Forward Level (dBmV), SNR (dBmV)

Tuner #1 - QAM Signal Levels (Day)

Current	Minimum	Average	Maximum
-2.37	-4.18	-0.68	0.57

Legend: QAM Power (dBmV), SNR (dBmV)

Tuner #1 - QAM Bit Error Rate (Day)

Current	Minimum	Average	Maximum
1e-04	1e-07		

Annotations:

- Customer account information
- Device who's graphs are currently being displayed
- The different neighboring devices being monitored can be selected by this drop down list
- Devices can be added, edited or deleted using these buttons
- Clicking on any of the daily graphs will show two day, weekly, monthly and yearly monitoring result graphs

Data Display Options:

By clicking on data display options you can bring up graphs comparing all customer devices and neighboring account devices which have been grouped under the single Net-Tracker account. You can compare **Box Signal Levels, QAM Signal Levels, QAM Frequency, QAM BER and QAM Uncorrected Errors** for all equipment in monitoring under the single subject account. Daily or weekly graphs can be selected for the comparison of these parameters. For modems and MTA's, you can compare **Ping Times, Signal Levels, Percent Errors, TX Levels and RX Levels** for the day or week.

Account Information:

Account Number:	17321902
Customer Name:	Malone
Node:	1X048
Comments:	ongoing video issues

Current Device Info:

Device Description:	HD 8300
Device Type:	SA8300D
IP Address:	10.6.10.218
MAC Address:	001Ac3392997

Select a Different Device:
Select a Device

Select a Different Display Option:
Data Display Daily Monitoring Table
 Compare Modems
 Compare Cable Boxes

Edit Account:

Customer Monitoring HISTORICAL RESULTS:

After clicking on the daily BER graph, these 2-day, weekly monthly and yearly graphs are shown

By clicking on the Data Display Options, you can compare graphs for all modems or cable boxes being monitored. (i.e. compare the BER graphs for all the boxes being monitored under this account)

2-Day Results

Current	Minimum	Average	Maximum
0.00e+00	0.00e+00	8.54e-06	8.50e-05

QAM BER
Last Update Wed May 13 20:01:06 2009
Graph Created Wed Jun 3 12:10:11 2009

Weekly Results

Current	Minimum	Average	Maximum
0.00e+00	0.00e+00	6.57e-06	8.50e-05

QAM BER
Last Update Wed May 13 20:01:06 2009
Graph Created Wed Jun 3 12:10:11 2009

Monthly Results

Current	Minimum	Average	Maximum
8.50e-05	0.00e+00	9.50e-06	8.50e-05

QAM BER
Last Update Wed May 13 20:01:06 2009
Graph Created Wed Jun 3 12:10:11 2009

Current Device Info:

Device Description: HD 8300

Device Type: SA8300D

IP Address: 10.6.10.218

MAC Address: 001Ac3392997

Select a Different Device:

Select a Different Display Option:

Data Display: **Daily Monitoring Table**

Compare Modems

Compare Cables

Edit Account:

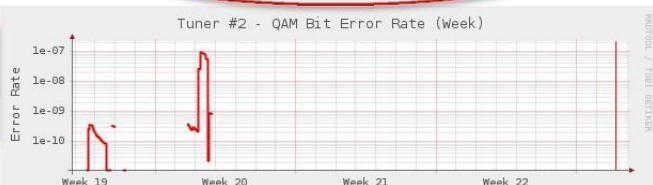
Here we've selected the page to compare the Weekly BER graphs for all the cable boxes being monitored under this account

- Box Levels - Day
- Box Levels - Week
- QAM Levels - Day
- QAM Levels - Week
- QAM Frequency - Day
- QAM Frequency - Week
- QAM BER - Day
- QAM BER - Week
- QAM Errors - Day
- QAM Errors - Week

Week 19	Week 20	Week 21	Week 22
Current 0.00e+00	Minimum 0.00e+00	Average 6.57e-06	Maximum 8.50e-05
Last Update Wed May 13 20:01:06 2009			
Graph Created Wed Jun 3 12:51:30 2009			

17321902: SA8300D - HD 8300 - Tuner #2

Problem Customer's Box, Tuner 2



Week 19	Week 20	Week 21	Week 22
Current 8.40e-10	Minimum 0.00e+00	Average 1.20e-08	Maximum 9.97e-08
Last Update Wed May 13 20:01:06 2009			
Graph Created Wed Jun 3 12:51:30 2009			

Downstream Customer, Tuner 1

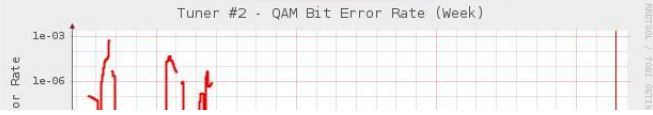
17321902: SA8300D - downstream EOL 17260806 - Tuner #1



Week 19	Week 20	Week 21	Week 22
Current 0.00e+00	Minimum 0.00e+00	Average 1.21e-04	Maximum 1.05e-03
Last Update Wed May 13 20:01:53 2009			
Graph Created Wed Jun 3 12:51:30 2009			

Downstream Customer, Tuner 2

17321902: SA8300D - downstream EOL 17260806 - Tuner #2



Search Accounts System

Account Information:

Account Number: 17321902

Customer Name: Malone

Node: 1X048

Comments: ongoing video issues

Current Device Info:

Device Description: HD 8300

Device Type: SA8300D

IP Address: 10.6.10.218

MAC Address: 001Ac3392997

Select a Different Device:

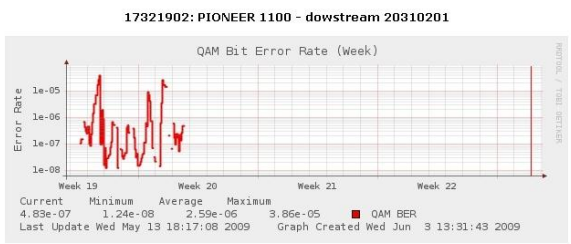
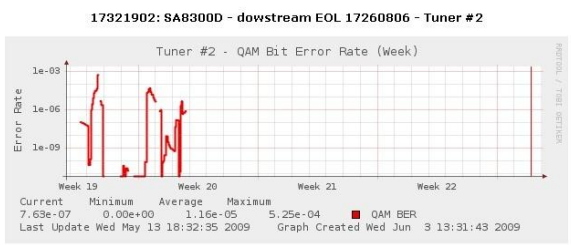
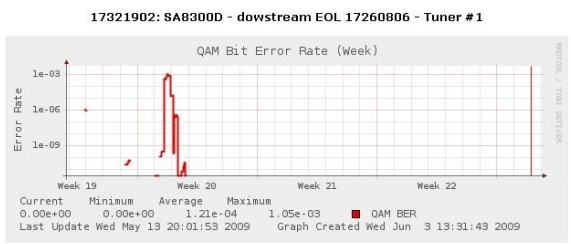
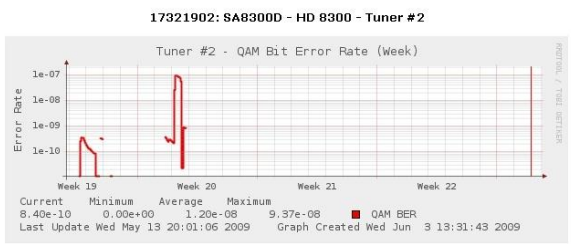
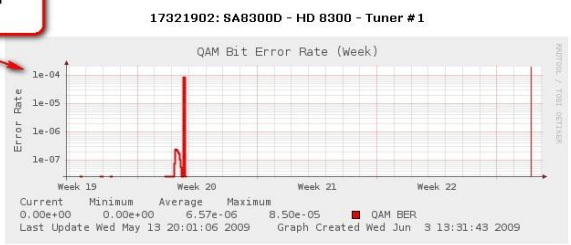
Select a Different Display Option:

Edit Account:

BER measurements are displayed in scientific notation rather than in decimal (i.e. A BER of 1.0E-04 is displayed instead of .0001 or 100u

Customer Graph Comparison:

Full screen shot of all three boxes (five tuners) being monitored. The user is able to quickly scan down the page to compare the graphs



Search
Accounts
System

Account Information:

Account Number:
17321902

Customer Name:
Malone

Node:
1X048

Comments:
ongoing video issues

Current Device Info:

Device Description:
HD 8300

Device Type:
SA8300D

IP Address:
10.6.10.218

MAC Address:
001Ac3392997

Select a Different Device:
Select a Device

Select a Different Display Option:
Data Display

Edit Account:

Customer Graph Comparison:

17321902: ARRIS TM502-G - emta #1369162

Current	Minimum	Average	Maximum
31.43	19.06	40.48	189.36
16.20	14.39	17.82	34.76
16.99	13.06	19.60	47.62

17321902: Motorola 5100 - hsd only #1369162

Current	Minimum	Average	Maximum
28.27	22.38	44.29	179.88
18.20	15.82	19.36	80.76
17.33	14.25	21.28	72.58

17321902: ARRIS TM402G - downstream 17263306 5007 N 62nd st

Comparison of weekly ping times for all modems has been selected

Above are just some of the highlights of Net-Tracker but these features don't speak to its most powerful advantage over other tools: zero cost to develop and implement. Net-Tracker was developed at no cost to Time Warner Cable and was implemented on old, obsolete hardware which the company was no longer using.

Net-Tracker provides an enormous time savings for the analyst over the standard monitoring software used on modems. With ServAssure, each device needs to be pulled up individually then the graphs pasted into a Word document for comparison to determine where in the cable network the issue began. This can take twenty minutes or more, depending on the number of devices being monitored. With Net-Tracker, this comparison is shown on a single screen and takes only seconds.

Another advantage of the program is the ability to add new features we need quickly because code is controlled internally. While many other features can be added, some future developments include email notification when equipment goes beyond threshold and a daily summary report for each account a Tier 3 Analyst is working on.