

## Datasheet: Network Time Machine for Carrier Service Providers

Service providers are rolling out mobile broadband networks to meet customers' needs for faster and richer data content. With increasingly complex network infrastructure, and ever-growing mobile IP traffic volume, network performance engineers, responsible for maintaining good user experience, are challenged to maintain the visibility of subscriber mobility and service performance.

### LTE Deployment Challenges:

- Mix of c-plane and u-plane at fast growing high traffic rate
- Seamless interoperability during migration from 3G to LTE
- End-to-end session visibility to subscriber activities
- Ensure user experience with dynamic data bearer assignment at right QoS level
- Ensure switch technicians have visibility to identify problems despite steep technology learning curve

### Triple-play Management Challenges:

- High traffic volume
- Ensure smooth Voice and Video service availability
- Maintain end-to-end quality of service
- Correlation between signaling and media traffic
- Retain traffic record for compliance and back-in-time analysis

### Data Center Operation Challenges:

- User experience visibility
- Isolate impairment across network segments or devices



Network Time Machine is a troubleshooting appliance designed for quick deployment and for traffic and packet level visibility in 20Gbps carrier environments. It provides extensive network and application visibility as well as the forensic details you need to solve signaling or data performance problems. It's also available as a portable or rackmount unit.

LTE Troubleshooting	Triple Play	Data Center
<p><b>Fast deployment for Visibility</b></p> <ul style="list-style-type: none"> <li>• Real-time PDN session creation detection</li> <li>• LTE/EPC control-plane and user-plane analysis</li> <li>• End-to-end VoLTE call analysis across EPC</li> <li>• Subscriber session analysis</li> <li>• Voice, video and data application issue isolation</li> </ul>	<p><b>Smart Voice, Video and Data Analysis</b></p> <ul style="list-style-type: none"> <li>• QoS analysis and playback of Voice and Video</li> <li>• Automatic correlation of signaling and media flows</li> <li>• Subscriber-based session analysis</li> <li>• Packet Loss and Latency Analysis across multiple network segments</li> </ul>	<p><b>Application Performance Troubleshooting</b></p> <ul style="list-style-type: none"> <li>• Performance Bottleneck Analysis quickly isolates issues to server or network</li> <li>• Visualize impairments across multiple segments</li> <li>• Application-aware analysis highlights performance issues</li> </ul>



## LTE Control and User Plane Analysis

Today's subscribers of 3G/4G services expect to be connected anywhere, any time. Their service should be "Always ON" and ready to send/receive voice, video and data communication with reliable performance. Subscribers need to be able to connect, authenticate and attach to the network and data service provider(s) effectively and reliably.

3G/4G handover, circuit-switch fall back and S1/X2 handover must happen seamlessly to update the bearer and service connection as subscribers move from place to place to ensure reliable voice and data service anytime, anywhere. When the interoperability of the control plane and user plane management elements break, engineers need visibility to the c-plane and u-plane transactions with details that traverse the Evolved Packet Core (EPC) to get to the root cause.

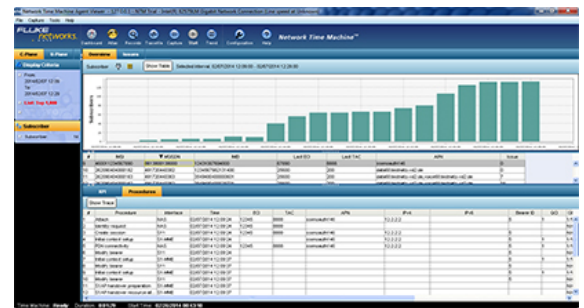
Network Time Machine can capture traffic from any interfaces in the 4G Evolved Packet Core (EPC). It is therefore able to analyze, organize, and extract relevant information relating to both control, and user plane, procedures from multi-terabytes of information to identify network element.

IMSI	MSISDN	Time Created	APN	UEIPv4	UEIPv6
262090404000003	491720440303	2/6/2014 20:13:57	data68.testnetz-vd2.de.mnc009.mcc262.gprs	172.30.186.79	2530:a400:b029:bbef:0:46:48f3:c501
262090404000003	491720440303	2/6/2014 20:15:09	voice68.testnetz-vd2.de.mnc009.mcc262.gprs	172.30.184.3	2530:a400:f00c:8f30:0:46:48f3:ef01
262090404000163	491720440363	2/6/2014 20:22:14	data68.testnetz-vd2.de.mnc009.mcc262.gprs	172.30.186.22	2530:a400:b006:b4e3:0:f:8868:d201
262090404000182	491720440382	2/6/2014 20:13:59	data68.testnetz-vd2.de.mnc009.mcc262.gprs	172.30.184.2	2530:a400:b017:5f1:0:f:8902:e601
262090404000182	491720440382	2/6/2014 20:09:25	voice68.testnetz-vd2.de.mnc009.mcc262.gprs	172.30.184.39	2530:a400:f00a:62dc:0:27:f989:2301

\*Track default bearers status and IPv4 & IPv6 address assignment during packet capture

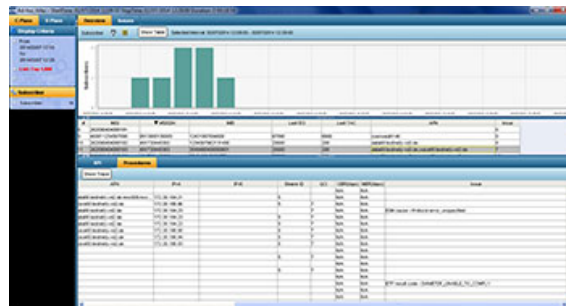
## Visibility to Subscriber Mobility Issues

Network Time Machine can process in real-time, control plane traffic to identify LTE subscribers' EMM and EMS sessions. Subscribers with procedure issues under an eNodeB, or a TAI or APN, are easily reviewed from the Atlas statistics view. Troubleshoot specific subscriber issues by generating an analysis of the UE that shows EMM and EMS status and issues. Additionally, troubleshoot issues with bearer and u-plane traffic statistics by specifying UE-ID such as IMSI or phone number to show mobility status of an UE. Custom reports, created from a template, can be exported and saved with a click of a button. Control plane and user plane packets associated with a subscriber can be easily extracted for detailed flow and session analysis in the integrated decode engine.



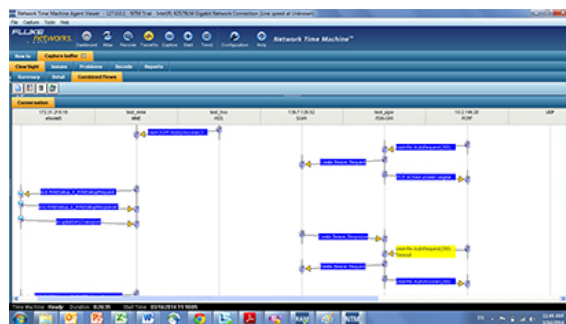
### Visibility to Bearer Issues

To ensure good user experience, provisioning the correct bearers with the proper QoS setup for carrying the various types of IP traffics is pivotal. Network Time Machine with the LTE Analysis option, provides visibility for the status of bearers that a subscriber has by simply typing in the subscriber's phone number or IMSI. Issues related to bearer setup procedures are shown and users are able to drill down to the session view or decode with just a few clicks.



### Visibility to End-to-end Session

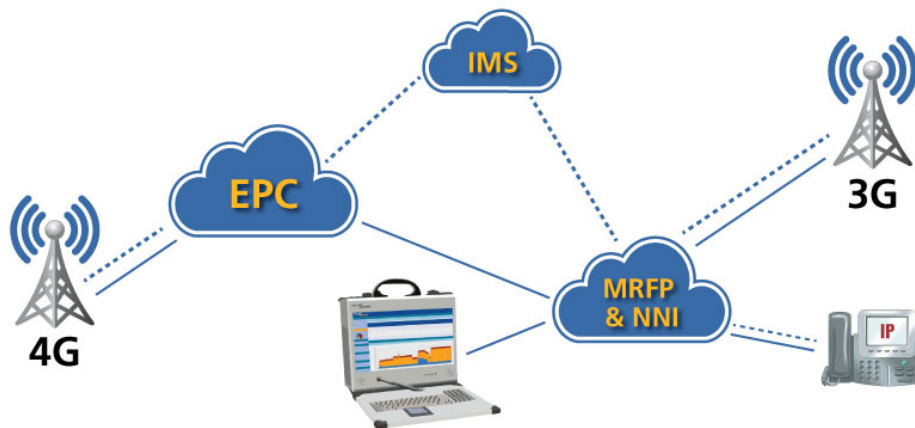
Users can select the c-plane and u-plane application of interest to construct a session view. Flows with issue(s) are highlighted in yellow and shown in a ladder view with timing information. Various filter conditions are available to extract just the packets required to review payload information for quick root cause identification.



### VoLTE/VoIP Analysis

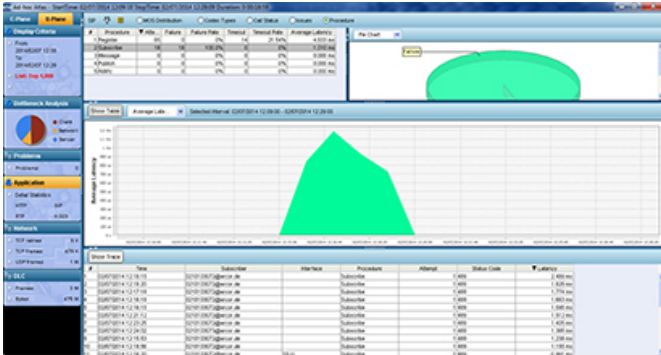
Getting Audio/Video over IP work is very important to service providers. Not only is it a revenue generating application within which subscribers can easily identify a degrade in network performance. This is especially true for VoLTE deployment as it needs to interoperate with IMS for seamless communication with subscribers on 3G/4G and PSTN networks. Key visibility requirements include:

1. Registration with IMS and Bearer provisioning
2. Voice Call and other SIP procedures
3. End-to-end QoS and Codec analysis

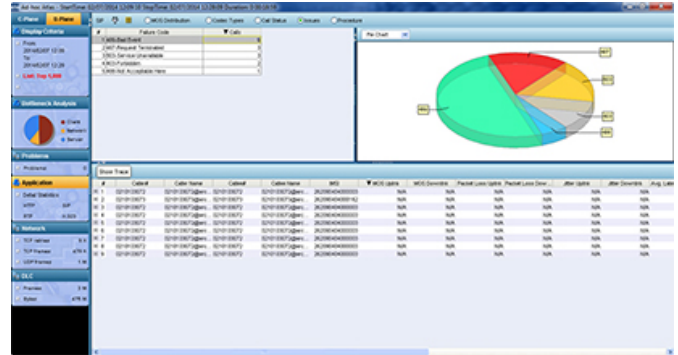


## Voice Call and other SIP Procedures

Network Time Machine analyzes all SIP traffic and offers KPI such as failure rate and latency of SIP procedures. SIP procedures that result in failure will be shown with the detail error code. The user is able to drill down to see a trend, as well as the subscriber who issued the call or experienced the failure. The packet relating to the procedure, such as IMS register failure, can be quickly extracted for detail analysis.



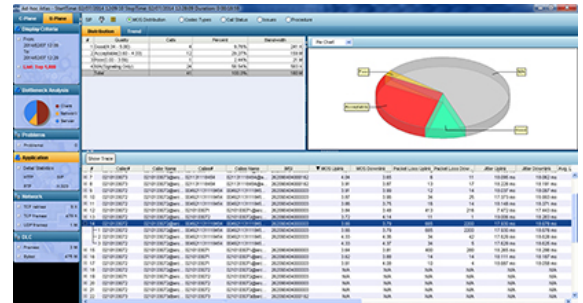
SIP procedure made during a period with caller issuing the request



SIP error code listing with affected SIP calls and procedures

## End-to-End Call Analysis

Network Time Machine automatically correlates signaling and media IP flows during analysis for quick visibility and packet extraction. It provides QoS analysis on voice and video over IP traffic for call centers and LTE networks. Even without visibility of the setup traffic, Network Time Machine can sniff out the RTP stream to generate assessment of the video/voice stream quality. The user can group calls by QoS parameters, such as MOS call quality or call type, by selecting subscriber phone number, MOS range, setup time range and call types. With the LTE option, Network Time Machine can group based on eNodeB, TAI or APN connected. Its high performance capture and analysis architecture make it an ideal quick-to-deploy analysis solution for VoIP/VoLTE in carrier grade operations.





## Video and Voice Call Playback

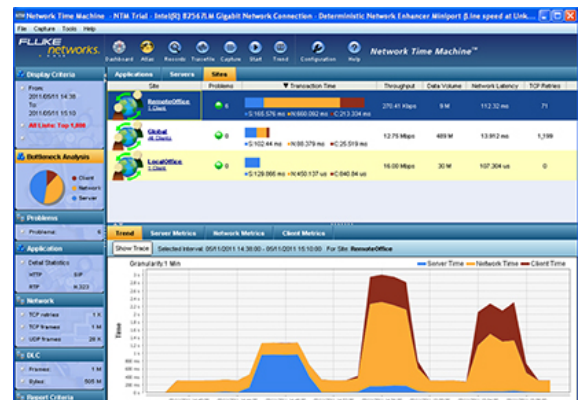
Network Time Machine supports many video and voice codecs, that are commonly used in mobile networks, including G.711, AMR-WB, EVRC, MPEG, and H.264. Audio and video can be replayed on its integrated player or exported to an external player so that engineers can replicate the user experience for forensic analysis.



## Visibility to Data Traffic Issue

### Performance Bottleneck Analysis

Network Time Machine automatically discovers applications and reports performance trending metrics by server, network and client site. The unique Performance Bottleneck Analysis (PBA) displays server, network and client site time for each TCP flow. PBA metrics show where application time is spent and immediately identifies the root cause of application performance complaints.



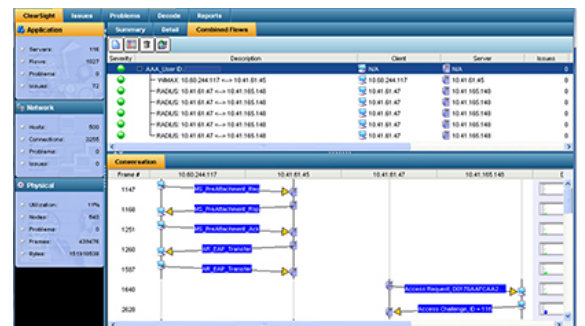
### Integrated Application Performance Analysis

Network Time Machine has embedded analysis capabilities that automatically align and assess all IP flows. User plane traffic throughput, servers involved and impairment are highlighted. It has built-in support for voice and video traffic analysis and playback. An optional LTE control signal analyzer is available and offers detailed LTE control signaling message analysis on c-plane and u-plane by LTE interface.



### Multi-Segment and Multi-Tier Analysis



Multi-tier and multi-segment analysis quickly correlates IP flows across network elements/segments with trace files collected from various data sources or through aggregation switches. Flow and packets with transport issues are highlighted for quick root cause detection and isolation. Ladder Views can be exported to a PDF file for documentation.



The proliferation of IP-based video and data application on fix-line and mobile service provider's network has posted great opportunities and challenges at the same time. Network Time Machine's versatile analysis capability and high performance stream-to-disk capture makes it the ultimate root cause analysis solution for today's high speed service provider's network. When it comes to maintaining networks for LTE, carrier, triple play and data center, Network Time Machine will make the responsible performance engineers and technicians feel fast and smart.

## Specification: Network Time Machine for Service Providers

### General Specification

	Portable	Rackmount
		
Base Model <sup>1</sup>	NTMC-PO2B <sup>2</sup>	NTMC-PR4H <sup>3</sup> or NTMC-PR4E <sup>3</sup>
Dimension	34.9cm (13.72") x, 41.9cm (16.46") x, 17.5cm (6.88")	Controller: 8.73 cm (3.44") x, 44.4 cm (17.48") x, 68.4 cm (26.93"), Expansion Storage: 8.68 cm (3.4") x, 44.6 cm (17.6") x, 60.2 cm (23.70")
Power Rating	AC: 650W, 100-240VAC, DC: 650W, 40-72VDC	Controller: Two hot-plug 1100W Expansion Storage: Two redundant 600W, 100-240VAC, Auto Sensing
CPU	Six-Core Intel Xeon E5645 2.4GHz	Two Six-Core Xeon E5-2620 2.0GHz
OS	Windows Server 2008 R2 Embedded	Windows Server 2008 R2 Embedded
Memory	NTMC-PO2B: 12 Gigabyte	16 Gigabyte
	NTMC-PO2BS: 24 Gigabyte	
Capture Interface	2 X 10 Gbps (SFP+)	2 X 10Gbps (SPF+)
	4 X 1 Gbps (SFP)	
Maximum Stream-to-disk performance	NTMC-PO2B: 10 Gbps	NTMC-PR4R: 10 Gbps
	NTMC-PO2BS: 20G bps	NTMC-PR4H: 20 Gbps
Maximum storage capacity	NTMC-PO2B: 8 Terabytes	NTMC-PR4E4 : 288 Terabytes
	NTMC-PO2BS: 7 Terabytes	NTMC-PR4H5 : 576 Terabytes

#### Note:

1. No SFP/SFP+/XFP transceivers are included with NTM. Please order separately CSN/ACC-90XX.
2. Supports both 1Gbps and 10Gbps interfaces but only one set of interfaces can capture
3. External Storage Appliance (ESA) is required to operate. Either CSN/NTM-EA-UGD or CSN/NTM-EA3-UGD, must be ordered separately. 48VDC version available.
4. Number of expansion storage arrays supported is 1, 2, 4, 6, 8
5. Number of expansion storage arrays supported is 2, 4, 8, 12, 16

## Ordering Guide

Hardware Models	Description
CSN/NTMC-PO2B-AC	NTMC Portable2B w/AC
CSN/NTMC-PO2B-DC	NTMC Portable2B w/AC&DC
CSN/NTMC-PO2BS-AC	NTMC Portable2BS w/AC
CSN/NTMC-PO2BS-DC	NTMC Portable2BS w/AC&DC
CSN/NTMC-PR4H	NTMC Premium 4H
CSN/NTMC-PR4E	NTMC Premium 4E
CSN/NTM-48VDC	48VDC Option for PR4E and PR4H (Factory Installed)
CSN/NTM-EA-UGD	24TB External Storage Array for PR4E and PR4H w/AC
CSN/NTM-EA-48VDC	24TB External Storage Array for PR4E and PR4H w/DC
CSN/NTM-EA3-UGD	36TB External Storage Array for PR4E and PR4H w/AC
CSN/NTM-EA-48VDC	36TB External Storage Array for PR4E and PR4H w/DC
Software Models	Description
CSN/NTMC-SW01	LTE decode option for NTMC
CSN/NTMC-SW02	Advanced LTE Control Plane Decode Package for NTMC
CSN/NTMC-SW04	VoLTE Analysis Package for NTMC
CSN/NTM-ATLAS	IP Traffic Analysis option for non-LTE IP network

## Gold Support

Models	Description
GLD-NTMC-PO2B	Gold Support for CSN/NTMC-PO2B, 1 Year
GLD-NTMC-PO2BS	Gold Support for CSN/NTMC-PO2BS, 1 Year
GLD-NTMC-PR4H	Gold Support for CSN/NTMC-PR4H, 1 Year
GLD-NTMC-PR4E	Gold Support for CSN/NTMC-PR4E, 1 Year
GLD-NTM-EA	Gold Support for CSN/NTM-EA-UGD, 1 Year
GLD-NTM-EA3	Gold Support for CSN/NTM-EA3-UGD, 1 Year
GLD-NTMC-SW01	Gold Support for CSN/NTMC-SW01, 1 Year
GLD-NTMC-SW02	Gold Support for CSN/NTMC-SW02, 1 Year

3 year Gold Support also available