



**LOCALITY: INNOVATIVE CELLULAR
NETWORK MANAGEMENT SOFTWARE**

Overview

Business is run on top of complex corporate networks that have a sophisticated set of tools to provide visibility into those networks. But today, organizations are not only relying on the corporate WAN network. Increasingly, the public cellular networks have become a key piece of the overall network infrastructure that companies depend on to transport mission critical data and applications.



The investment made in cellular deployments by businesses is significant including devices, monthly service and mobile application development. It is often the case that these cellular networks are supporting an organization's front line field workers – those that are closest to customers and the organization's most critical assets and infrastructure. However, unlike their wired counterparts, there are few tools available to monitor the performance of cellular data networks. But now, that's all about to change.

Benefits of Locality

Locality™, from NetMotion Wireless, is cellular network performance management software that gives organizations the insight and visibility needed to optimize their mobile data deployments. Using coverage maps and detailed reports, Locality identifies the causes of poor connectivity, creates an inventory of deployed devices and monitors data usage, resulting in more productive field workers and reduced expenses.

Using Locality, you can gain:

- **Increased efficiency in managing a mobile deployment.** Increased visibility enables managers to be more effective and make informed decisions about carriers, wireless technology and devices with less effort.
- **Increased productivity in the field.** With improved network connectivity, mobile workers are more efficient, less distracted, and more productive. More productive workers can get more done in the same amount of time, resulting in increased revenues.
- **Increased productivity for your support organization.** Fewer support calls, and real data to work with for those that do come in, means lower support costs.
- **Reduced data service plan expenses** through elimination of unused or under-used data plans.

This paper describes how Locality works, introduces the maps, reports and business intelligence that it produces, and defines the product's technical requirements.

Architecture

Network management products for wired networks use protocols such as SNMP, JFLOW, SFLOW, and NetFlow that were designed for networks with low levels of packet loss. When high levels of packet loss are encountered, these protocols can lose information that is vital to understanding and pinpointing the causes of poor network reliability. To overcome these challenges many wired network management products require the use of a separate, dedicated management backbone to provide reliability in the event the monitored enterprise system is degraded.

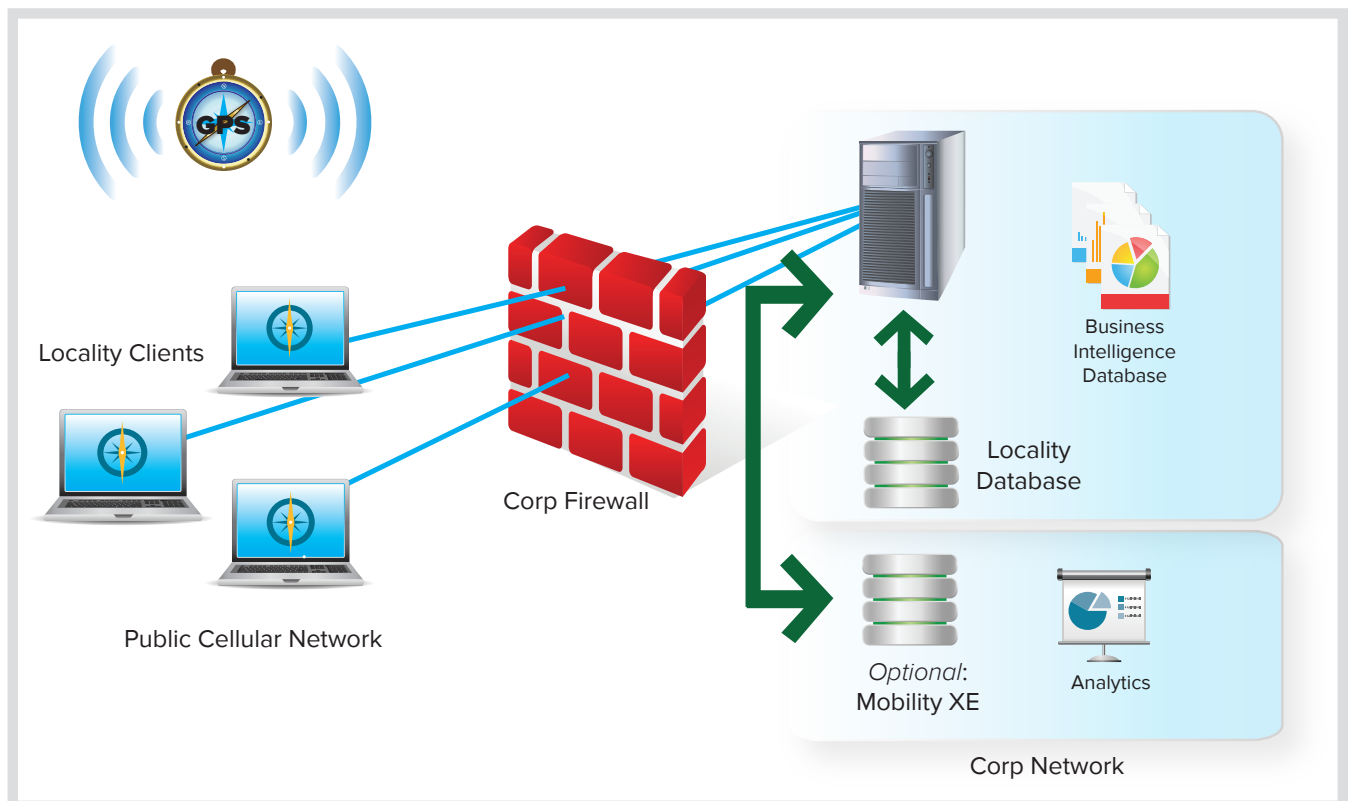
Unlike wired management systems, Locality is designed specifically to manage wireless networks by using heuristic methods to gather performance metrics, even when full network connectivity is not available. Locality captures important data including received signal quality, connection status, data usage, application usage, location, and network technology as long as the cellular modem is active (it does not have to be connected).

At a regular interval, if the device is connected, the agent then compresses and transmits this data back to the Locality server via HTTPS, averaging between 12 and 24 kilobytes per hour. If the device is not connected, then the agent will collect and store the data for a defined period of time, and will send the data opportunistically when the device has a connection using reliable store-and-forward techniques, preventing the loss of important data.

The Locality server receives the data, stores it in a database, then displays it in interactive maps and charts in the Locality console. This information is then available for deep inspection and analysis of system performance.

As an option, the Locality server can pull in data from the Mobility XE Analytics Module, which provides additional application level visibility and reporting.

Locality Architecture



In order to generate Coverage and Device Maps, GPS must be activated and functional on the mobile devices with the Locality client. Locality is able to gather location information without disrupting existing applications such as dispatch and vehicle tracking, which may also be querying the GPS receiver.

Locality supports two categories of GPS receivers:

- An external GPS receiver connected via serial or USB
- A carrier network adapter containing an integrated GPS receiver

Locality supports those GPS devices that communicate to the mobile device via NMEA or TAIP communications protocols, and are supported both by the device manufacturer and the cellular carrier. For more detail on the GPS receivers supported by Locality, please see the Deploying Locality section of this paper, or visit:

<http://www.NetMotionWireless.com/Locality/Requirements>

If the GPS receiver is unavailable, all of the non-location performance information is still collected and included in Locality’s business intelligence reports.

Locality Maps and Reports

Locality provides visibility into cellular network performance via a coordinated set of maps and reports. Mapping features show network performance and connectivity metrics corresponding to the locations of mobile workers over time. Reports provide critical insights and answers about a mobile deployment.

Locality includes the following categories of maps and reports:

Category	Description
Network Performance	Access a comprehensive view of your overall cellular network performance, including coverage, signal quality, technology and utilization information. See where poor signal quality, older network technologies or dropped connections may be having an impact on mobile worker productivity.
Network Usage	Understand your overall cellular network usage. Analyze your employees’ data usage, by carrier, user or application.
Dropped Connections	Monitor cellular connectivity problems with detailed information on dropped connections for all of your users.
Inventory	Comprehensive, real-time view of your cellular network adapters and firmware.

Network Performance

The Network Performance tab gives you all the tools you need to truly understand how your cellular data network is performing. These include:

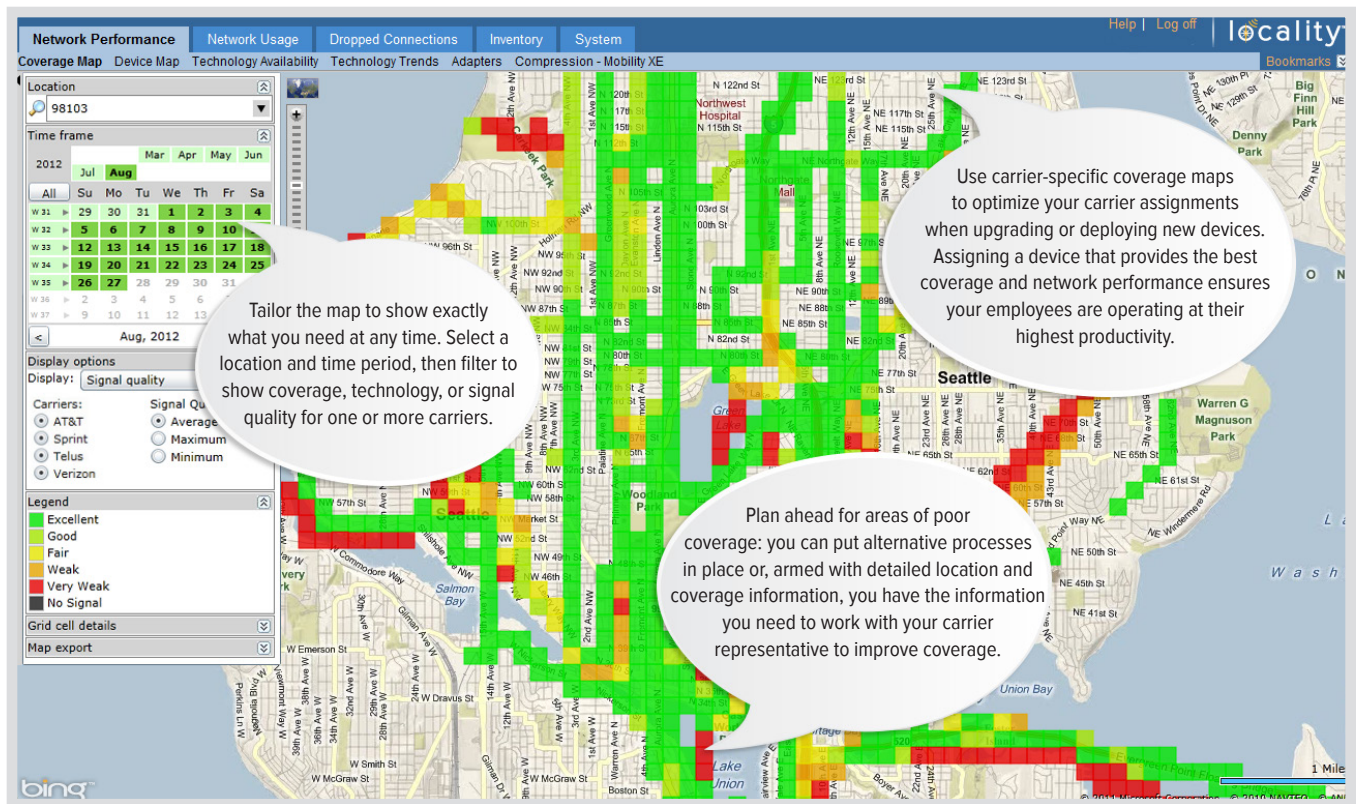
- Coverage Map
- Device Map
- Technology Availability Report
- Technology Trends Report
- Technology Adapters Report
- Mobility XE Compression Report

Coverage Map

Using data collected from your mobile devices, Locality allows you to see aggregated network coverage statistics for each of your carriers, including signal quality and available technology.

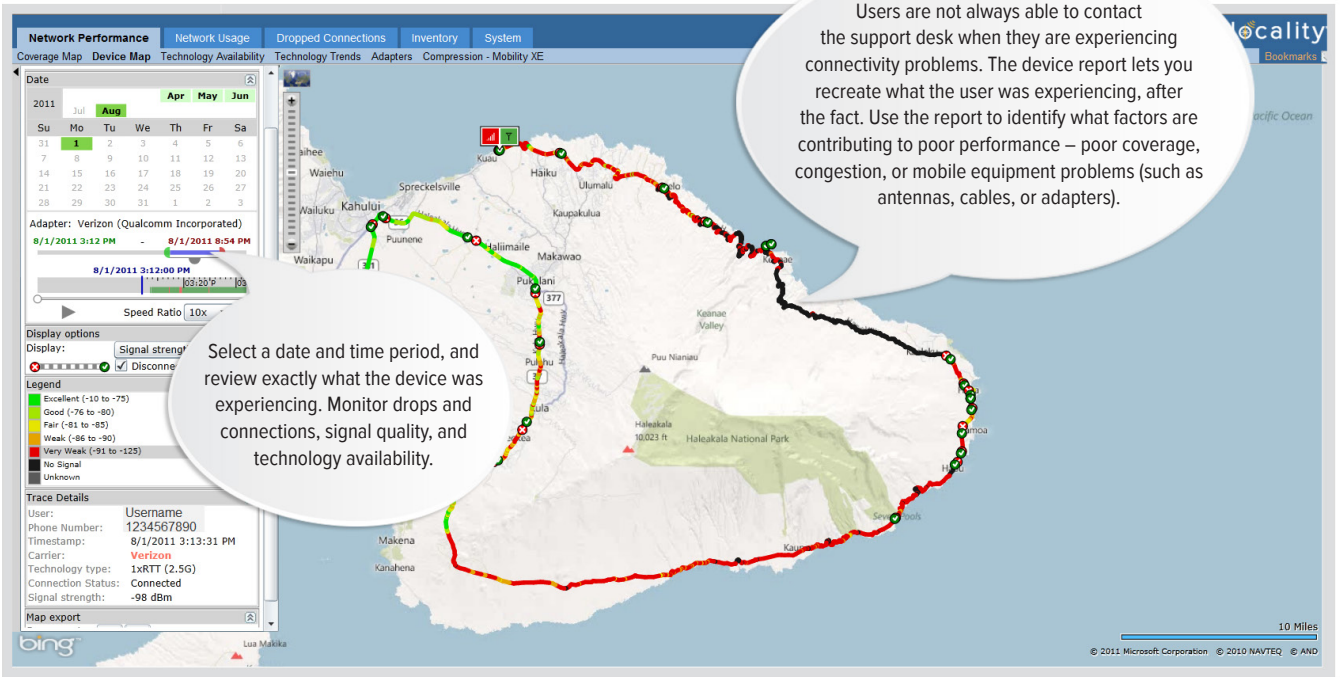
You can use these maps to:

- Analyze network signal quality and technology type in areas used by your workers.
- Compare differences in coverage, signal quality and technology generation by carrier.
- Proactively identify areas where coverage is unavailable or consistently of poor quality



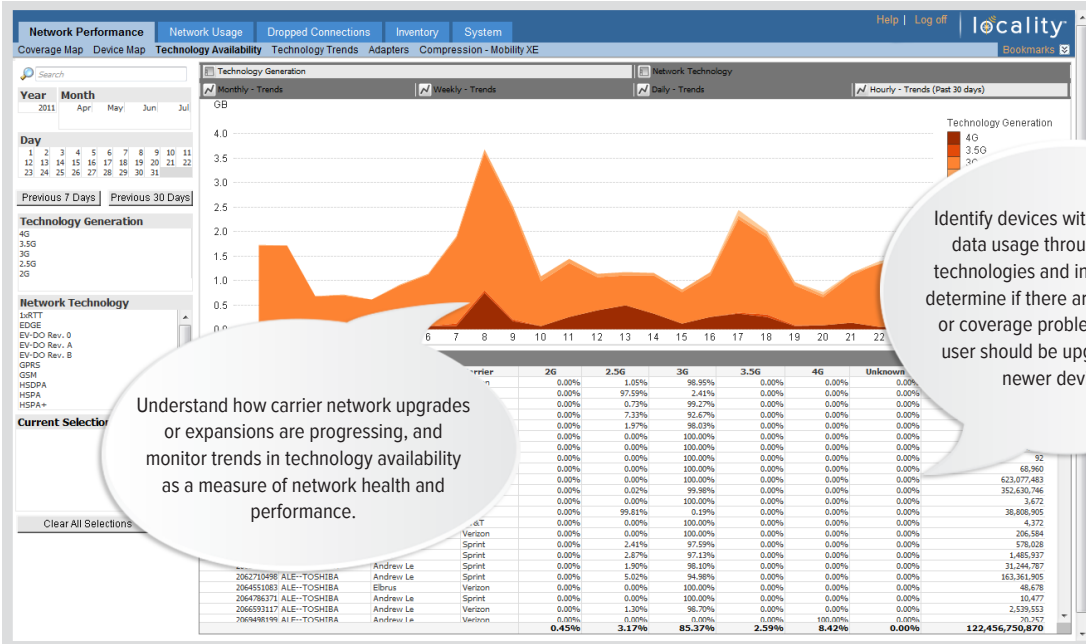
Device Map

Track minute by minute usage of individual devices, and see where poor signal quality, slower network technologies, and dropped connections have occurred.



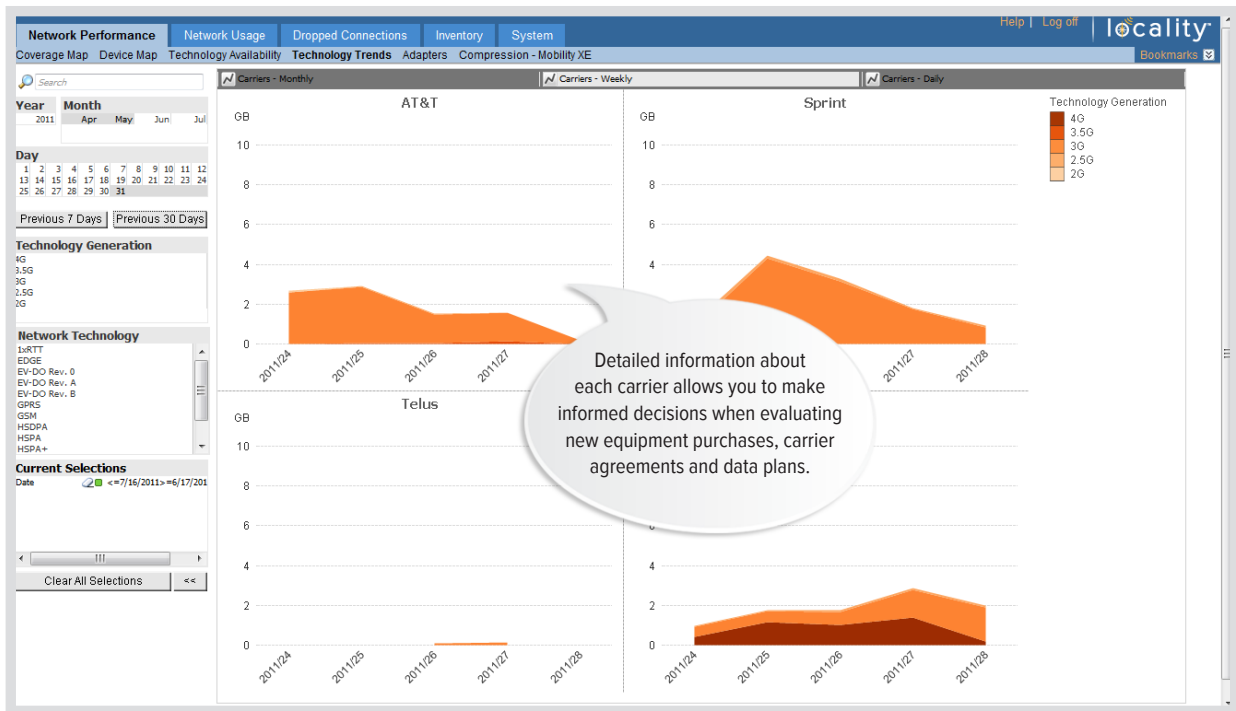
Technology Availability Report

See data usage and trends by network technology generation. Monitor how each user is utilizing the various technologies. View information by phone number, device name, user name, or carrier.



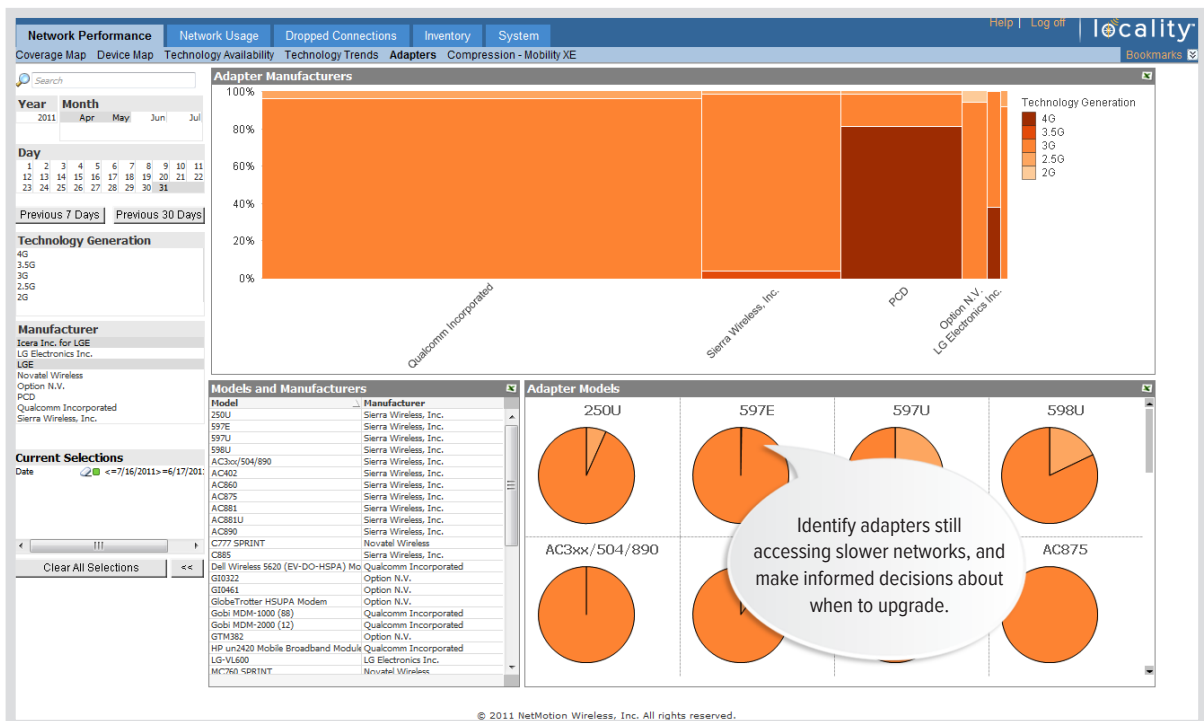
Technology Trends Report

Compare utilization of various network technologies across carriers.



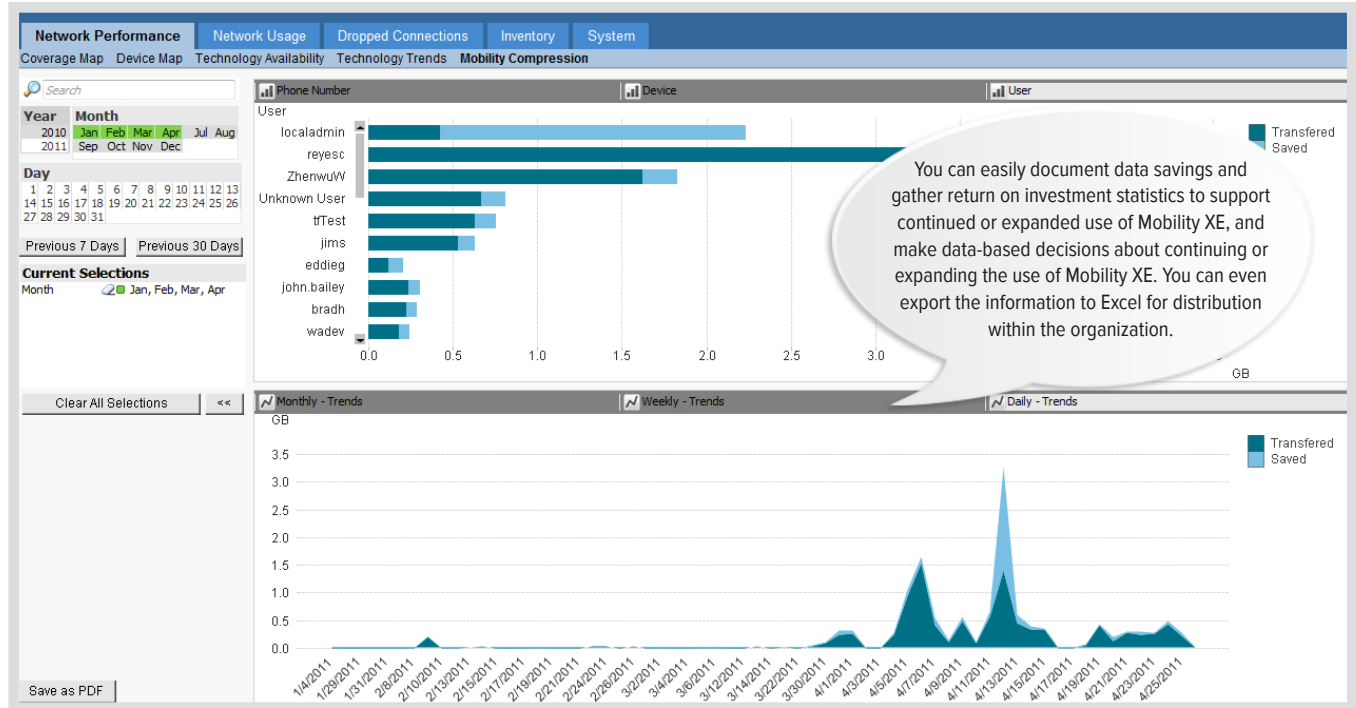
Adapters Report

View what technology is being used by each adapter, and identify adapters associated with slower network technologies.



Mobility Compression Report*

Get at-a-glance information about the data savings achieved using Mobility XE data compression. Use detailed reporting to quantify the data plan cost savings resulting from your Mobility XE deployment.



* This report is only available to customers with mobile deployments using the Mobility XE Analytics Module.

Network Usage Reports

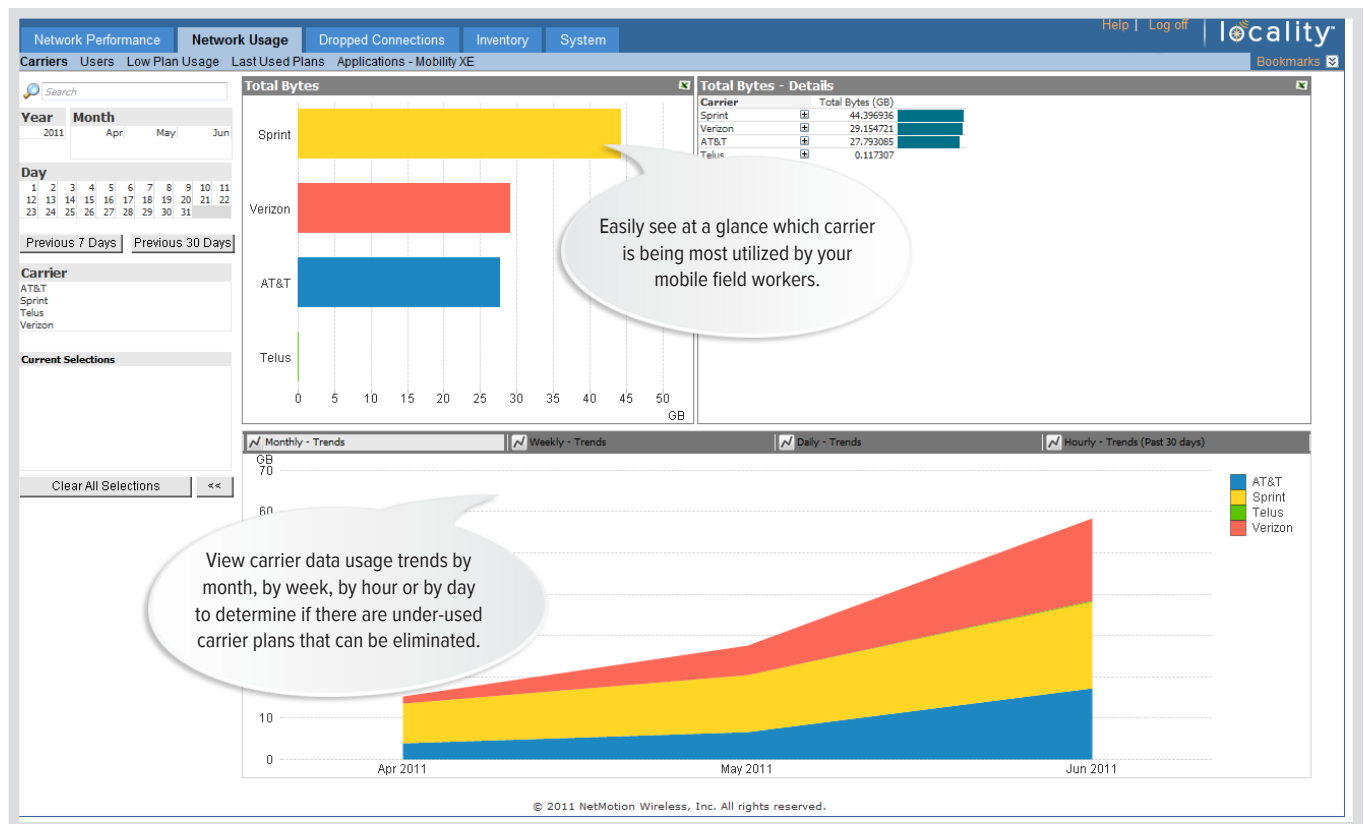
The next suite of reports can be used to analyze data usage by carrier, by user, and by application. Using usage reports it is easy to identify unused and under-utilized mobile devices, allowing you to cancel or redeploy these lines of service.

These reports include:

- Carriers Report
- Users Report
- Low Plan Usage Report
- Last Used Plans Report
- Applications Report (requires Mobility XE with the Analytics Module)

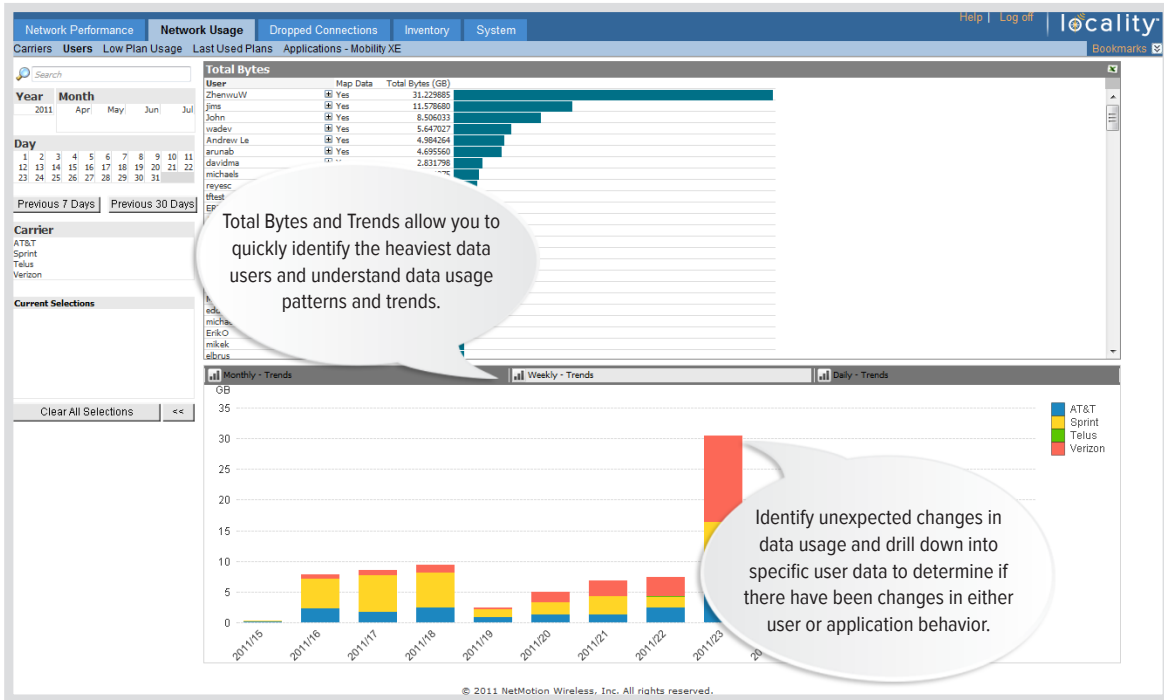
Carriers Report

See data usage trends for each carrier to easily compare the amount of traffic being sent across each network.



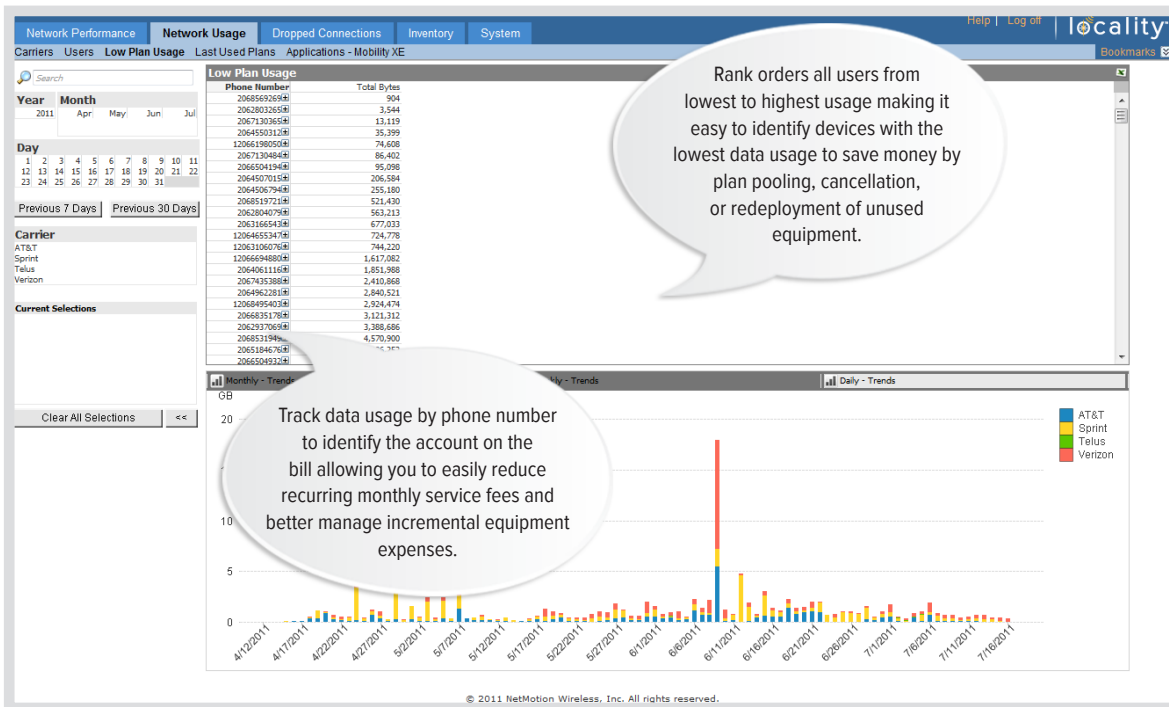
Users Report

Utilize this report to see data usage and trends for each user, device, phone number, and carrier.



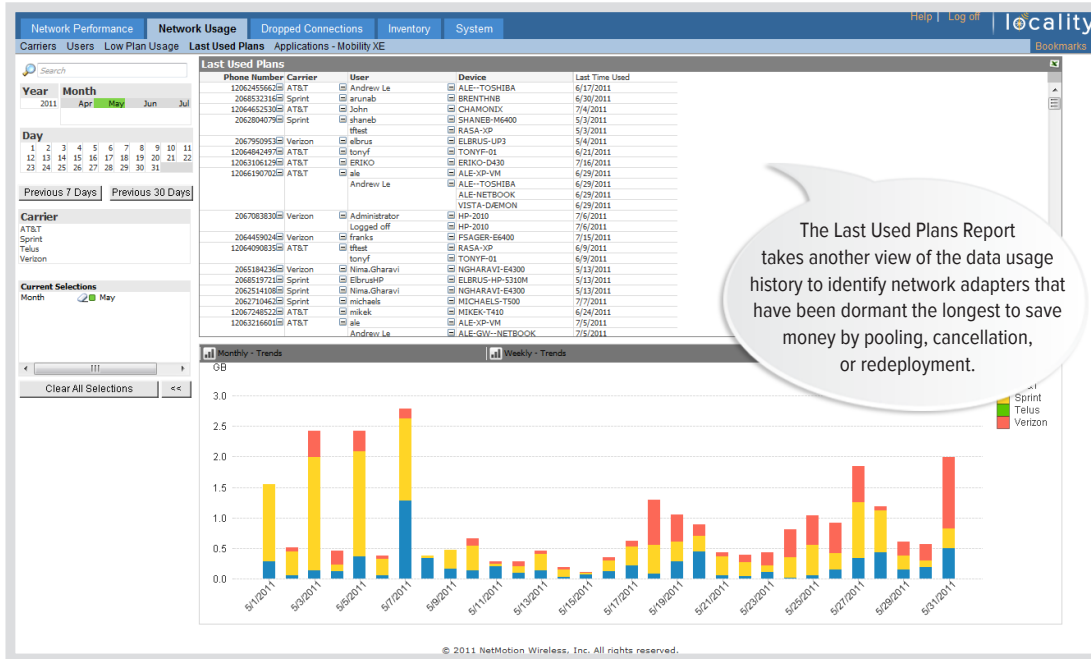
Low Plan Usage Report

This report shows the phone number and carrier of the cellular network adapters with the least amount of data usage.



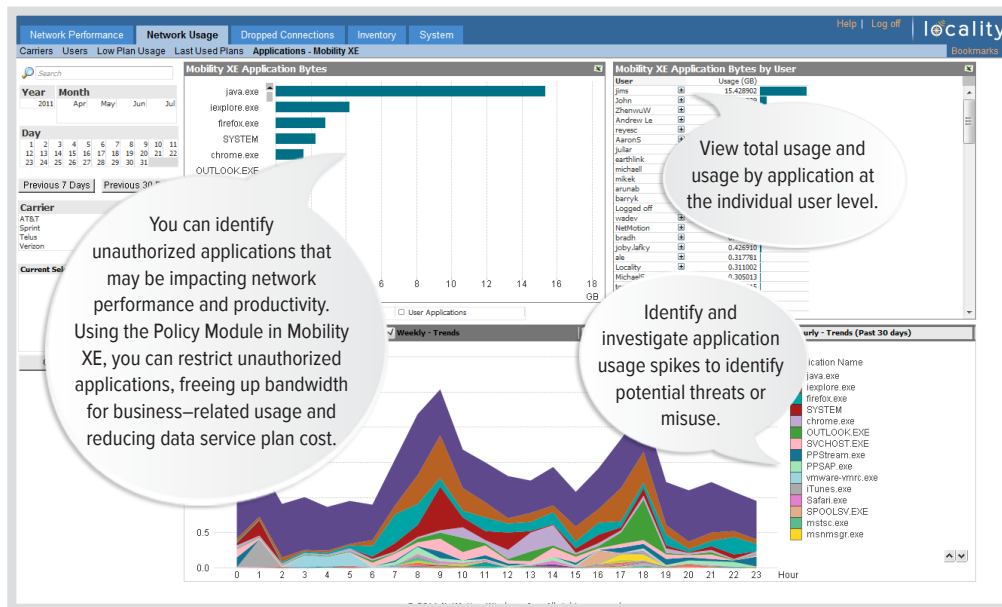
Last Used Plans Report

Locality gives you the ability to view your data through many different filters. Identify when cellular network adapters were last used to make sure that you are not cancelling needed lines of service.



Applications Report*

The Applications Report provides detailed data consumption by application, user, device, and phone number. You can use this report to monitor what applications are consuming the most bandwidth, trends in application use over time, and unexpected usage patterns that may be indicative of malicious applications, viruses, or worms.



*This report is available to customers using Locality in conjunction with the Mobility XE Analytics Module.

Dropped Connection Reports

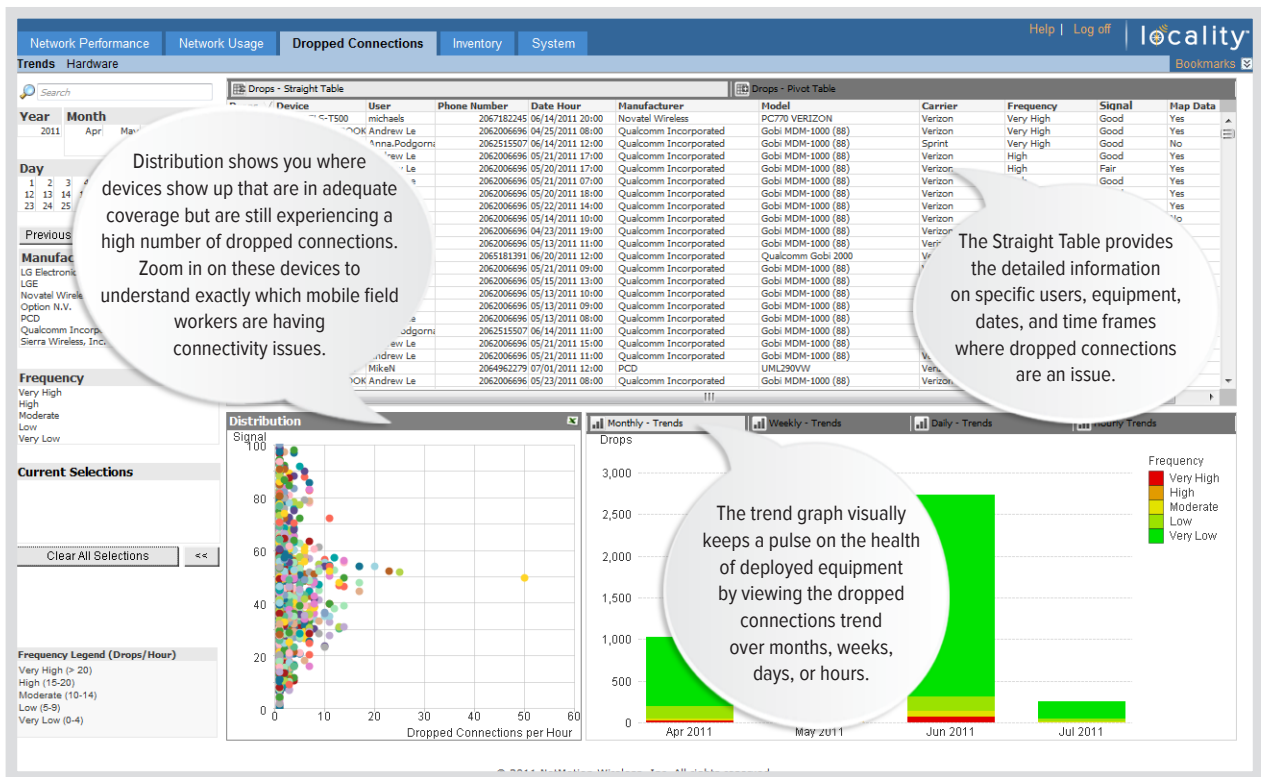
Provides the number of times a device has been disconnected in any 60 minute period of time. A disconnection could be caused by inadequate coverage, or by a mobile field worker disconnecting the modem. A large number of disconnections in a given hour when the device is reporting a strong signal quality indicates that there is a device problem.

There are two types of reports in this category:

- Trends Report
- Hardware Report

Trends Report

Provides visibility into the severity and frequency of dropped connections per hour by device, adapter configuration, carrier, and signal quality. Begin your troubleshooting with factual information about actual device performance.



Hardware Report

See the frequency of dropped connections by adapter manufacturer, model, and firmware revision.



Inventory Reports

Ensure your equipment is always up-to-date and avoid unnecessary equipment expenses by using the Locality Inventory reports. These reports provide a comprehensive overview of your hardware, and correlates your hardware to key account and service information. The inventory reports include:

- Population Report
- Configuration Report

Population Report

This report provides inventory information for all adapters, including carrier, adapter manufacturer, model, and firmware revision. You can use this report to obtain an accurate and up-to-date list of all devices and actual adapter configurations.

Adapter Usage in Deployment

Manufacturer	Model	Firmware version	Adapters	% Population
Novatel Wireless	Total		2	9.09%
Option N.V.	GI0322	4.2.1 (Date: Sep 03 2008, Time: 15:00:00)	1	4.55%
		4.4.0 (Date: Jul 27 2009, Time: 17:00:00)	1	4.55%
	GI0461	2.14.2.0Hd (Date: Dec 18 2009, Time: 11:29:46)	1	4.55%
	GlobeTrotter HSUPA Modem	2.11.1.0Hd (Date: Sep 10 2009, Time: 10:09:42)	1	4.55%
	Total			13.64%
PCD	UML290VW	L0290VWB333F.230		9.09%
	Total			09%
QUALCOMM INCORPORATED	Dell Wireless 5620 (EV-DO-HSPA) Mobile Broadband Mini-Card	09010012		5%
	Gobi MDM-1000 (88)	D1020-SUUAASDA-4357.1 [Jan 07 2009 17:00:00]		5%
		D1050-SUUAASDA-21510A.1 [Jul 16 2009 13:00:00]		5%
		D1050-SUUAASDA-21520C.1 [Nov 06 2009 13:00:00]		5%
	HP un2420 Mobile Broadband Module	0901000d		5%
		09010095		5%
	Total			25%
Sierra Wireless, Inc.	597J	p2314500		5%
	598U	p2511202		5%
		p2513401		5%
	AC860	U1_2_40BACAP G;/WS/FW/U1_2_40BACAP/MSH720		5%
	AC881U	F1_2_3_15AP C;/WS/FW/F1_2_3_15AP/MSH720		5%
	USB 308	M3_0_10_13AP C;/WS/M3_0_10_13AP/MDM8200/SI		5%
	Total			27%

Carrier/Manufacturer

At a glance, you can understand your total adapter population and distribution. Use this information to determine if you have the right mix of devices, or if there are devices that should be replaced.

Planning and tracking the progress of adapter replacements or firmware upgrades is easy with this report. You can see real-time information on all the details of each of your devices, and identify devices needing upgrades.

Configuration Report

In addition to providing inventory information for each adapter, the configuration report also includes key service information, including phone number, carrier, device, user, last-used date, IMEI, ESN and MEI. Detailed information linking equipment and users can help you control costs and monitor equipment usage.

The screenshot displays the 'Adapter Configuration' report in the Locality software. The report table includes columns for Phone #, Manufacturer, Model, Firmware version, IMEI, ESN, and MEI. Callouts highlight key features: identifying service lines for device loss, matching phone numbers with ESN/IMEI/MEI and last users, and identifying users for device replacement. Pie charts for Sprint and Verizon show the distribution of manufacturers like Option N.V., Qualcomm Incorporated, and Sierra Wireless, Inc.

Adapter Configuration

Phone #	Manufacturer	Model	Firmware version	IMEI	ESN	MEI
2062006696	Qualcomm Incorporated	AD600	V10d	12413000154899	-	-
2062502609	Novatel Wireless	Dell Wireless 5620 (EV-DO-HSPA) Mobile Broadband Min	09100011	980040001968312	8093A30A	A100001767E88B
2062506216	Novatel Wireless	Dell Wireless 5620 (EV-DO-HSPA) Mobile Broadband Min	09100012	980040003909090	80864758	A1000008888888F
2062507823	Sierra Wireless, Inc.	Qualcomm Gobi 2000	0a030010	353093030794737	80DCC38F	A10000010A8EA73
2062514108	Sierra Wireless, Inc.	Qualcomm Gobi 2000	U1_2_40BACAP_G1/W5/FW/U1_2_40BACAP/MSM6275/SRC	357896002489977	-	-
2062515507	Sierra Wireless, Inc.	Qualcomm Gobi 2000	F1_2_3_ISCAP_C1/W5/FW/F1_2_3_ISCAP/MSM7200R3/SRC	354218010682334	-	-
2062619955	Sierra Wireless, Inc.	Qualcomm Gobi 2000	M2_0_11_10AP_C1/W5/FW/M2_0_11_10AP/MDM6200/SRC/	3594750211882122	-	-
2062710498	Novatel Wireless	Novatel Wireless	D1050-SUUAASDA-21520C 1 [Nov 06 2009 15:00:00]	355449024158149	80E1666F	A1000010966810
2062710607	Novatel Wireless	Novatel Wireless	Novatel Wireless	122	589748A3	-
2062710646	Novatel Wireless	Novatel Wireless	Novatel Wireless	122	589751FC	-
2062713620	Sierra Wireless, Inc.	Sierra Wireless, Inc.	Sierra Wireless, Inc.	0	60A5CC9B	A1000001918D3F
2062803265	Novatel Wireless	Novatel Wireless	Novatel Wireless	0	6082F8E6	A1000004B9426C
2062804079	Novatel Wireless	Novatel Wireless	Novatel Wireless	11566000581360	80EASD81	A10000010903740
2062935798	Novatel Wireless	Novatel Wireless	Novatel Wireless	129	589C8A1D	-
2062937669	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	p2513401	60D31756	A1000004B5D0B7
2062937684	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	163	58550126	-
2062937685	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	163	80D2EEF6	A10000176D0C15
2062937686	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	980040003334174	80D2EEF6	A10000176D0C15
2062937687	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	980040003326188	809A71DF	A10000176D0DF6
2062937688	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	p2110004	60447464	A10000019E2DDC
2062937689	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	132	58C832A7	-
2062937690	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	115	5896755E	-
2062937691	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	163	58383F66	-
2062937692	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	353093031026741	8063644E	A1000010A94514
2062937693	Qualcomm Incorporated	Qualcomm Gobi 2000	Qualcomm Gobi 2000	11559004272113	80190575	A100000881EDF0

Callouts:

- You can use this report to identify the service line for deactivation when a device is reported lost or stolen.
- Easily match up the network adapter phone number with ESN, IMEI, MEI, and see the last person using it, as well as the last date it was used.
- If an adapter is in need of replacement or upgrade, this report allows you to easily identify the current user account and contact them for device maintenance.

Legend:

- Option N.V.
- Qualcomm Incorporated
- Sierra Wireless, Inc.
- Others
- Novatel Wireless
- LG Electronics Inc.
- PCD

Deploying Locality

Locality is easy to deploy, with minimal capital or resource investment required. A wizard-based installation makes Locality easy to deploy. It is built on the Windows platform and requires only one server, making the resource cost to deploy very low. It is invisible to the end user and leverages existing investments in mobile devices and GPS. No new end user hardware or training is required. Locality also works with all VPN solutions.

Technical Requirements

Locality will continue to expand the list of supported operating systems and modem adapters over time. For the latest in technical requirements and product updates, please visit:

<http://www.NetMotionWireless.com/Locality/Requirements>

NetMotion Wireless plans to test and support all of the leading cellular network providers, adapters, connection managers and GPS devices for operation with Locality. NetMotion Wireless will support leading NMEA or TAIP compatible GPS devices, including those integrated within tested network adapters. NetMotion Wireless will only support embedded GPS receivers if they are supported by the carrier, the adapter manufacturer and the laptop/netbook manufacturer.

In order to assist our customers in their strategic planning, NetMotion Wireless adheres to the following procedures:

- NetMotion Wireless will maintain a current list of tested cellular network providers, adapters, connection managers and GPS devices on our website.
- When an adapter or GPS device is discontinued by the carrier or vendor we will, to the best of our ability, continue to test and ensure future versions of Locality agents operate with these devices until the carrier or manufacturer stops supporting them.

The interactions between cellular network adapters, connection managers and Locality agents are complex. Some connection managers automatically receive and install firmware updates that may be incompatible with Locality. NetMotion Wireless will make effort to address incompatibilities between Locality and listed adapters and connection managers as they are discovered.

Locality Server Requirements

You must install all Locality server components on a single machine. In general, servers with additional processors or faster processors will support greater activity by a larger number of users. For more information on the Locality server requirements, visit:

<http://www.NetMotionWireless.com/Locality/Requirements>

Learn More

For more information about NetMotion Wireless and Locality, please visit:

<http://www.NetMotionWireless.com/Locality>



www.NetMotionWireless.com

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