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**Nitro™**

# Release Notes v1.14

**March 2023**

# **System Level Information**

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- Performance Management Enhancements

## **May 2020**

- Capital Sales Model
- CBRS Channel Selection

## **April 2020**

- Dynamic IP addressing support in the Nitro Router/Firewall

## ***Known Problems***

## **New Feature Detailed Descriptions**

### Firmware Updates Available

<b>Abstract</b>	New On-Premise Edge-GW and CBSD firmware updates available
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	<p>New On-Premise Edge-GW firmware version available for upgrade</p> <p>New CBSD firmware version available for upgrade</p> <p>Availability improvements - Various availability improvements further enhance the ability to continue providing service incases of scheduled or unscheduled downtime with the Nitro hosted core elements.</p> <p>Security improvements - New firmware introduces various security improvements that further harden the deployed On-Premise Edge-GW's deployed.</p> <p>Performance improvements - New Virtual EPC version, which is a part of the Nitro LTE solution deployed on the Edge-GW includes various performance improvements that reduce the amount of service traffic over the network and increase Edge-GW data throughput.</p> <p>Defect fixes - New firmware includes various defect fixes that have been resolved and implemented since the previous released firmware versions.</p>

### Uplink Carrier Aggregation Support

<b>Abstract</b>	Support for Carrier Aggregation on Up Link (CPE perspective)
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	<p>Motorola Solutions Nitro customers that require greater throughput speeds on the up link can now leverage Carrier Aggregation (CA) on the Up Link (UL) from an User Equip (UE) and or Customer Premise Equipment (CPE) perspective. You can aggregate 10 or 20 MHz contiguous or non-contiguous channels to increase throughput on the UL.</p> <p>Note: There is a dependency on the User Equip (UE) and or Customer Premise Equipment (CPE) as they must have CA on the UL support in order to take advantage of this capability.</p> <p>CA on the downlink has been supported previously with the appropriate UE and or CPE support.</p>

Nitro Multi-RAN

<b>Abstract</b>	Support for Multiple RAN's under one Customer Account
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	<p>Motorola Solutions Nitro customers with large deployments and multiple networks can now manage them together from the Nitro portal. Each network can continue to function independently with unique groups of UEs and APNs supported by each network. If desired, UEs can also be configured to connect to either a “Shared APN” or have their data “Home routed” back to their home network from other networks also owned by the same customer.</p> <p>In a “Home routed” configuration, all of the data is routed back to the UEs “Home RAN” across a secure connection between the two networks. Only UEs that have been configured to have access in more than one network are permitted to connect in networks that are not their “home” network. This configuration is managed from the Nitro portal.</p> <p>In a “Shared APN” configuration, UEs from any network owned by the customer can access a common shared APN/network which is available in all of their Nitro networks. A typical use case would be to give internet access to the UE regardless of which network the UE connects to. Customer's can define one or more shared APNs and configure which UEs have access to the shared APN(s) from the Nitro portal.</p> <p>It is possible to configure different UEs in a Multi-RAN with “home only” access, “Shared APN” access, or “home routed” access.</p>

Nitro Northbound Interface (NBI)

<b>Abstract</b>	Northbound Interface for Nitro
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	
<b>Description</b>	<p>The Nitro Northbound Interface (NBI) is a set of services provided by Nitro which will allow customers access to Nitro network information. Information examples include configuration information (e.g. type and number of CBSDs in a network), status information (e.g. current fault status on network elements), and performance and usage reports via a file download.</p> <p>Nitro NBI services can be broken up into three categories:</p> <ul style="list-style-type: none"> <li>• Queries - These services are delivered via an HTTPS request / response exchange between the client and Nitro.</li> <li>• Streams - These services are delivered over a web-socket. Streaming events are queried and delivered until the socket is closed. Stream access will provide the following data:</li> </ul>

	<ul style="list-style-type: none"> <li>○ Fault Status - Changes in fault status per network element.</li> <li>○ Events - Reported events from Nitro elements</li> <li>○ Record Availability - As new records become available for download, the stream interface will inform the client of the record name.</li> <li>● Records - These services are delivered via download access to files stored in Nitro. Nitro will collect performance statistics and store them on a customer by customer basis. These records will be recorded in the Nitro MDR detailing the network, date range and any other defining information. A list of records can be obtained via the Query interface and will also be sent over the streaming interface to applicable connected networks. Records can be downloaded by requesting a download from the Query interface.</li> </ul> <p>The NBI API is directly accessed via URL: <a href="http://nitro-nbi.commandcentral.com">nitro-nbi.commandcentral.com</a>. Partners and Network Administrators can create client credentials (the credentials that API clients use to gain access) as well as configure client privileges. Customers must have a WoC account in order to gain access to the NBI. While it's largely the customers responsibility to consume data delivered over the NBI, Nitro provides adapters or connectors for popular client platforms like Splunk, Zabbix or the Elastic stack.</p>
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### Simplified Onboarding for Nitro SIMs

<b>Abstract</b>	Simplified onboarding for ordered Nitro SIMs
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	
<b>Description</b>	<p>Nitro has integrated SIM shipment data into the Nitro Portal, simplifying the onboarding process. To take advantage of the new onboarding automation, the Nitro operator must associate the MSI Customer Number used in the ordering system with the Nitro Customer Account using the Nitro Portal. This will allow the customer to see any relevant SIM order shipment information. Mapping can be done at any time but it's important to note that SIM order data is imported on a daily basis to the Nitro Portal backend and is saved for a period of time (currently 180 days). Failure to enable mapping outside of this window will prevent the user from seeing corresponding customer order shipments. It's highly recommended to do this step upon account creation for new customers.</p> <p>When MSI receives a SIM order, associated ICCIDs are scanned and included within the order shipment data sent to the customer for each received order. Then upon receiving the SIM shipment, the customer can view and select the shipped order information on the Nitro Portal and allocate SIMs to the Nitro network with a few simple clicks. Checks are implemented to prevent importing of wrong ICCIDs. Customers can then export the allocated SIMs to a CSV file, select a suitable subscription plan, and register them using existing Portal procedural operations.</p>

### Host Agency Support

<b>Abstract</b>	Nitro now supports Host & Shared Agency capability within a given customer Network.
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	Please contact the Motorola Sales team for more information.

<p><b>Description</b></p>	<p>Host Agency &amp; Shared Agency support enables an existing Nitro customer (Host Agency) to add a separate &amp; distinct group of users (Shared Agency) to their Nitro network and allow that agency to manage their users on their own.</p> <p>When Host Agency support is enabled for an existing Nitro customer (Host Agency), MSI can allocate a group of Paid in Advance Data Plans to the customer's network and create a new/separate Shared Agency account to manage those users. This Shared Agency account only has control over the End Users/SIM's associated with the Shared Agency and has no visibility to any infrastructure equipment or other network settings.</p> <p>The Host Agency always has complete control of and visibility to the Shared Agency users and can also assess data usage of the Shared Agency users.</p> <p>Host Agency is enabled by MSI via the Portal. Prior to enabling this support, MSI requires the following documents:</p> <ol style="list-style-type: none"> <li>1. Host Agency Clause - from the Host Agency</li> <li>2. Host Agency Acknowledgement - from the Host Agency</li> <li>3. Shared Agency Agreement - from the Shared Agency</li> </ol> <p>Host Agency is only supported for End User Data Plans (Basic &amp; Unlimited) and can be purchased by either the Host or Shared Agency.</p>
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### Layer 3 Network Support

<p><b>Abstract</b></p>	<p>Nitro now supports a Layer 3 architecture for Network deployments</p>
<p><b>System types Affected</b></p>	<p>Nitro</p>
<p><b>Special Configurations</b></p>	<p>Please contact the Motorola Sales team for more information.</p>
<p><b>Description</b></p>	<p>Previously, CBSD/eNodeBs had to be interconnected over a layer 2 switched network using a combination of physical connections and Ethernet switches. If customers had multiple sites with a routed network connecting them, Nitro was not able to interface with it without special equipment or complex configurations. CBSD/eNodeB sites can now be connected back to the RAN Prime Site over a layer 3 routed network.</p> <p>Nitro customer RAN's can now be deployed over Layer 3 Routed Networks by introducing firewalls instead of switches at remote CBSD/eNodeB sites. Firewalls deployed at remote sites connect back to the RAN Prime Site using encrypted IPsec tunnels providing segmentation from the customers' backhaul as well as privacy of the customers' data.</p> <p>The main firewall at the RAN Prime Site needs two separate interfaces on separate subnets, one for its Internet connection to connect back to the Nitro Core, and another for connection to a Layer 3 backhaul network to provide connectivity to the CBSD/eNodeB "Extended Site" Firewalls. Each firewall connected to the backhaul network will need a customer provided:</p> <ul style="list-style-type: none"> <li>● IP address and subnet mask</li> <li>● IP address of the next hop gateway</li> </ul>



	<p>CBSDs and/or eNodeBs connect directly to the Extended Site Firewalls. The Prime Site can accommodate CBSD's and/or eNodeB connections in its switch(es) and is referred to as Site 0.</p> <p>The Layer 3 design is ideal for large systems using outdoor units with GPS antennas such as large campuses, neighborhoods, or towns. A customer can use their existing network to backhaul the sites even if it has other traffic and if it's a hybrid of layer 2 and layer 3 networking. A single RAN can scale to 80 sites plus Site 0, co-located at the Prime Site.</p> <p>Notes:</p> <ul style="list-style-type: none"> <li>• RANs are deployed using either the Layer 2 or Layer 3 design. The design and equipment configurations are incompatible. The customer's backhaul in a layer 3 deployment can be a hybrid layer 2/layer 3 network. Consult with the Nitro Transport Team for details.</li> <li>• If the Layer 3 design is used for indoor deployments, each Extended Site requires a PTP Server to provide clocking for any CBSDs. PTP Servers are also available as a backup for GPS typically used in conjunction with outdoor unit deployments.</li> </ul>
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New PTP Grandmaster

<b>Abstract</b>	A new model of FibroLAN's Grandmaster Clock is now available for use within Nitro Systems
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	<p>FibroLAN has introduced a new PTP Grandmaster model - the uFalcon MX/G. The new model will supersede the existing uFalcon ST/G model in any new Nitro system deployments. The uFalcon MX/G introduces a number of new capabilities and improvements. One improvement of note is the number of supported clients has increased from 30 to 128, and the ability to support a maximum of 256 total clients with additional software licensing. This greatly reduces the number of PTP units required to support large deployments. Additional improvements/features include:</p> <ul style="list-style-type: none"> <li>• GPS Antenna operates on 5 volts allowing for longer cable runs</li> <li>• 2 x 10G SFP+ ports</li> <li>• 2.5G support on the SFP ports (all 6)</li> <li>• Better timestamping (PTP) accuracy (~1nsec)</li> <li>• 2 x SMA Sync ports (10MHz/1PPS/30Hz), input/output</li> <li>• Enhanced SyncE performance</li> <li>• ToD/1PPS input/output interface</li> <li>• Full wire speed packet generator and analyzer (can run traffic tests; e.g. RFC2544)</li> <li>• LDAP authentication (along with RADIUS and TACACS+)</li> <li>• Email (SMTP) notifications</li> <li>• Static routing in HW</li> <li>• Increased number of 1PPS/10MHz ports</li> </ul>

- Dual Band GNSS
- Linux based OS, allowing for greater flexibility when adding future features

The new uFalcon-MX/G can interop with the older ST/G unit assuming the number of system clients doesn't exceed the ST/G's limit of 30 and redundancy is not required. If redundancy is needed, all PTP Grandmasters must be of the same model.

### Transport Plug & Play - Switch Configuration

<b>Abstract</b>	Switch configuration setup has been automated
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	<p>The transport Plug and Play feature is designed to streamline the Nitro infrastructure networking equipment setup. The procedure will generate savings in customer service, as it minimizes the need for user intervention. A downloadable application bootstraps networking equipment so that the Nitro Plug and Play framework can then access it and automatically update and configure the component. After the switch is connected to the network and bootstrapped by the application on a connected service laptop, the Transport Plug and Play framework downloads and activates the latest firmware, configures the device, and sets up unique passwords.</p> <p>The feature is supported on all Motorola Solutions recommended Juniper switches (EX3400-24P, EX4300-32F, EX4300-48MP).</p>

### 256 QAM support

<b>Abstract</b>	Support of 256 QAM capability has been added to Nitro CBSDs
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	<p>Nitro CBSDs now include support for 256 QAM. The addition of 256 QAM support increases the downlink (DL) throughput. Under ideal conditions, the user can expect to see data rates of 105 Mbps DL with the use of a single 20 MHz CBRS channel. The feature has no impact on Uplink speeds.</p> <p>The latest CBSD firmware version (15.17.50.1125) supporting 256 QAM is available on the Nitro Portal. No additional steps are required to take advantage of this feature. When the CBSD install is initiated, the new firmware containing 256 QAM is automatically activated.</p>

### SLX 5000 CBSD Support

<b>Abstract</b>	Support for new SLX 5000 Outdoor CAT-B CBSD
<b>System types Affected</b>	Nitro

<b>Special Configurations</b>	N/A
<b>Description</b>	Introducing support of the new SLX 5000 CBSD in addition to the existing SLX 2000 and SLX 4000 CBSDs in the Nitro portfolio. The SLX 5000 is a CAT-B compact, Pico-class CBSD with dual carrier or sector support designed for outdoor deployments. It comes with ethernet and fiber backhaul capabilities, higher power capable of max EIRP, and integrated 17 dBi antennas with options for external antenna connections if deployment requires. The SLX 5000 will support a larger coverage area with the higher power and improved receive sensitivity. Depending on where coverage is needed, the CBSD can be mounted on either a wall or a pole. The GPS antenna enables the SLX 5000 to keep itself synced up to the rest of the network. Each CBSD has the capacity to support up to 128 active users in its coverage area.

### Performance Management Enhancements

<b>Abstract</b>	Performance Management capabilities have been expanded to now include RAN Performance Statistics and UE Connection Status info
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	New dashboards have been added to the Nitro Portal that enhance diagnostic capabilities with RAN Performance Statistics and UE Connection Status Info. The Performance RAN stats enable access to raw data reports with over 2000 KPIs and LTE parameters associated with eNBs in the customer network. The Connection Status dashboard offers diagnostic information that provides the indication of which CBSD the customer's devices are attached to along with the device state and IP address. The new dashboards can be found under the Performance Tab within the Nitro Dashboard.

### Capital Sales Model

<b>Abstract</b>	New offer model allowing Partners to make a capital purchase and resell Nitro infrastructure components
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	<p>MSI is adding a new sales model in addition to the existing Monthly Service Fee Model currently in place. Nitro infrastructure (CBSDs and Edge Gateways) sold through the Monthly Service Fee Model are tied to subscriptions for each component and MSI retains title to these hardware components covered by the lease. The Firewall/Routers &amp; PTP Servers are included as part of the lease/subscription.</p> <p>To provide greater flexibility to fit different partner and customer budgeting needs, MSI is now introducing the Capital Model. This offer allows Nitro infrastructure products (CBSDs, Edge Gateways, Firewall/Routers, &amp; PTP Servers) to be purchased by the partner and resold to the end customer. Ownership of the equipment transfers to the end customer. It's important to note monthly subscriptions are still required for each CBSD and Edge Gate to access the Nitro Core</p>

(EPC) and provide additional value features. The subscription rates are significantly lower than the rates associated with the Monthly Service Fee Model.

UE purchase and associated subscriptions remain unchanged and are the same for both the Monthly Service Fee and Capital Models.

### CBRS Channel Selection

<b>Abstract</b>	CBRS Channel Selection
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	<p>Nitro now offers a service that controls and manages channel selection and grouping from the SAS (Spectrum Access System). The service is accessed through the Nitro Portal and allows for greater network design flexibility and spectrum coordination. Nitro customers now have the ability to:</p> <ul style="list-style-type: none"> <li>• Request either a specific 10 or 20 MHz channel from the SAS to be assigned to a specific CBSD</li> <li>• Request a range of 10 or 20MHz channels from the SAS to be assigned to a specific CBSD.</li> <li>• Create groups of CBSDs who share a frequency or frequency range. This is done by creating and naming lists of either specific 10 or 20MHz channels or ranges of channels and assigning individual CBSDs to members of these lists.</li> <li>• Allow Nitro Demo Kit customers to select from a pre-specified list of frequencies/bandwidths to be assigned to CBSDs in the Nitro Demo Kit.</li> </ul>

### Dynamic IP addressing support in the Nitro Router/Firewall

<b>Abstract</b>	Dynamic IP addressing support in the Nitro Router/Firewall
<b>System types Affected</b>	Nitro
<b>Special Configurations</b>	N/A
<b>Description</b>	<p>The firewall/router now has the option to use dynamic IP addressing when applying configuration information. This eliminates the need to preconfigure the firewall with IP information before shipping it to the customer. Purchasers will have the ability to either select a dynamic or static IP addressing scheme when placing an order for a Nitro system. When a Dynamic VPN (Virtual Private Network) is to be used, the firewall gets its WAN (Wide Address Network) IP address through DHCP (Dynamic Host Configuration Protocol) from the network it is connected to. It then continuously attempts to connect automatically with the Nitro Core. Dynamic IP addressing also provides an added benefit for firewalls used within Demo Kits. The LTE Modem's SIM card can now use dynamically assigned IP addresses rather than requiring static IP addressing.</p>

