Project Description and Timeline

Motorola Solutions, Inc. (Motorola) is proposing an expansion of the Nitro Private Broadband Solution that extends last mile internet connectivity to City of Mesa resident's homes. The Nitro solution consists of the necessary hardware, software, and services to expand coverage of the private LTE system. Motorola's proposed Nitro technology will provide residents with private broadband data, high capacity, cost-effective scalability, and wide-ranging coverage. Motorola's design expands upon the initial Nitro implementation to deliver broadband connectivity to underserved residents. Users will enjoy in-home data coverage by utilizing Customer Premise Equipment (CPE) as an access point for connectivity to a range of devices, including computers, smart phones, tablets, legacy Wi-Fi devices, and more.

Scalability — The Nitro solution that can scale up to hundreds of sites, supporting tens of thousands of homes. This expansion includes (20) CBSD sites, featuring (3) CBSDs with (6) corresponding sector antennas per site. These sites will utilize existing Radio Access Network, RAN, hardware.
Content and Network Control — The Nitro OnPrem Gateway allows you to integrate directly into your existing network for complete control of all data. Nitro also follows the 3GPP Air Interface Standards, so that every user needs a provisioned and controlled SIM Card to access. This means that the City of Mesa will have total visibility into which users and devices are on the network, with greater control over the content that each user is able to access.
Capacity and Performance — LTE allows efficient allocation of broad-band spectrum, offering equal and predictable performance at all times. A fully mitigated band mitigates interference, providing users with full access to clean spectrum.
Security — All components of the Nitro solution adhere to the five pillars of cybersecurity as determined by the National Institute of Standards and Technology (NIST): Identify, Protect, Detect, Respond, and Recover, ensuring system cybersecurity and lowering potential risks. Nitro also provides full end-to-end encryption, from the core down to the site infrastructure.
Coverage — Nitro will provide superior outdoor coverage for your users' devices. Leveraging the power of CBRS broadband, Nitro can bring broadband data access to every user within your geographic footprint.

Also, 5 years of monitoring, advanced replacement, and software user agreements are included to support the new site infrastructure. This expansion will allow the City of Mesa to provide internet access to an additional 64,855 citizens.

The digital divide does have economic costs and closing this divide by providing citizens with internet access will lead to an increased ability and opportunity for the underserved citizens to find employment. Underserved students will also have increased opportunity due to having internet access that they previously didn't have.

Development

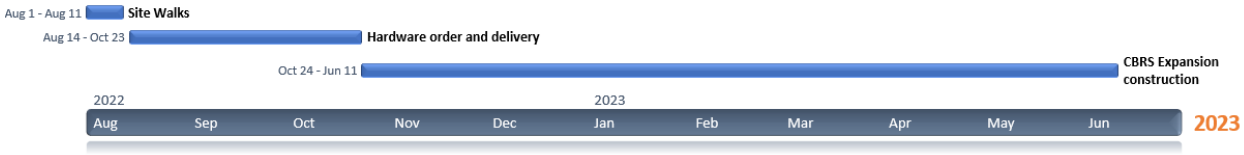
Motorola Solutions is pleased to propose an expansion of Mesa's NitroTM solution, a private broadband network that will expand coverage of critical broadband data and maintenance services that keep network features available and up to date. The proposed Nitro solution combines the system capacity, range, mobility, quality of service, and self-optimized deployment

benefits of Long Term Evolution (LTE) communications, with the simple network architecture, unlicensed spectrum, and neutral host capabilities of Wi-Fi.
Motorola is proposing a (20) site expansion to extend broadband coverage for the City of Mesa. Each of the (20) new site locations feature (3) Motorola outdoor Citizens Broadband Radio Service Devices (CBSDs), with each CBSD connected to (2) sector antennas. This (6) sector design is a common topology for 360 degree coverage. Sites will be determined based on areas of need and future site walks. (20) new 60' direct embed, metal monopole structures with installation are included in this proposal, (1) at each CBSD site. The City of Mesa will provide power and network connections for the implementation of the Nitro system.
The Nitro solution provides scalable infrastructure to meet the required speeds, capacity of users/devices, and coverage areas to serve the City of Mesa. Motorola Nitro provides an end-to-end fully managed broadband network infrastructure to meet both present and future needs. Motorola implemented scalable RAN hardware as part of the Phase 1 proposal which will be utilized for the expansion. 5 years of monitoring, advanced replacement, and software user agreements are included to support the new site infrastructure.
The Nitro network solution proposed to meet the City of Mesa's current and future needs includes the following components:
Access to the Nitro Cloud Core, which processes network communications and coordinates low-level device operations without the cost and risk of maintaining physical core hardware. The Nitro solution includes the necessary on-premises Firewall/Router for securely connecting to the core. The Nitro core, network, and users are managed through the Nitro Cloud Provisioning Portal.
Citizens Broadband Radio Service Devices (CBSD) that provide coverage and capacity for network devices. The proposed design will have CBSDs installed at (20) total locations. Each CBSD will have (2) sector antennas connected to it for a total of (6) per site. There are (60) CBSDs included in this proposal.

Network traffic is kept private and secure using encryption, security credentials, and a firewall-protected connection between the Nitro Cloud Core and the City of Mesa's on-premises hardware. Broadband data is encrypted in-transit and in the cloud to protect against unauthorized access. Network equipment configurations are only accessible through the Nitro Cloud Provisioning Portal, with access protected by user credentials. Traffic between the Nitro Cloud Core and on-premises components is secured using an IPsec Virtual Private Network (VPN) connection. The details of the solution components of the Nitro network are included in the following sections.

This expansion will allow us to serve an additional 64,855 people, as well as over 2,000 businesses, households, and anchor institutions.

The City of Mesa will be paying [redacted] for infrastructure and services for the following 5 years after construction and installation.



System Components

Nitro is the first fully-managed radio network that provides business-critical private broadband data and comprises four major components.

Nitro Cloud Core

A cloud-based LTE Evolved Packet hosted by Motorola Solutions.

Nitro Cloud Provisioning Portal

A browser-based application where customers interact with their Nitro networks. Nitro Cloud Provisioning Portal enables configuring and viewing the status of the Nitro network.

Devices

Used to transmit and receive data.

Radio Access Network (RAN)

A network physically installed on the customer's premises comprising devices such as firewalls, switches, and Citizens Broadband Service Devices (CBSDs).

Nitro™ System operates on Motorola Solutions infrastructure, which is maintained and monitored for the user.

The deployment is simple and the expense structure is predictable with significantly lower upfront infrastructure to purchase, and a fully-managed cloud-based core. Nitro Cloud Core components included in the system are:

- LTE Evolved Packet Core (EPC)
- PTT Application Servers
- Fault Manager
- Configuration Manager
- Internet Gateway

Nitro is a cloud-based solution with components both physically located on the customer's premises and other located in cloud data centers. Nitro ensures security through the following:

Nitro Cloud Core security:

- All components are hardened and protected by firewalls.
- Software is kept up to date (additional details in section 5.2)
- The system is equipped with fault and security monitoring.
- Malicious code and vulnerability scans are performed on a regular basis.

 Portal access is secured with partner login credentials.
 Sensitive data at-rest is secured.
 Sensitive data in-transit between the Nitro Cloud Provisioning Portal and the customer premises is secured by using IPSec.

Nitro On-Prem equipment security:
 On-prem equipment is hardened and protected by a firewall.
 IP routes are not shared between customers.
 Firewall policies prevent traffic from flowing between customers.
 Citizens Broadband Radio Service Devices (CBSDs) and the Nitro OnPrem Edge Gateway are configured remotely, with no local access.
 Switch access is secured with login credentials.
 Sensitive data in-transit between CBSDs and the RAN firewall is secured by using IPSec.

Scalable and Affordable:
 Minimal upfront expense as the Cloud Core provides the LTE EPC core, HSS, and Edge Gateway.
 All the SMA/HMP, OS, and Security patches are all included and installed, lowering your overall maintenance costs.

Security and Reliability Focus (On-Prem and in the Nitro Cloud):
 All components are hardened and protected by firewalls. Firewalls On-Prem and in the Cloud Core ensure that the Cloud Core stays protected and the network fully protected.
 Software is kept up-to-date.
 Malicious code and vulnerability scans are performed regularly. Code scans, Information Assurance (IA), and vulnerability tests are regularly done to identify any vulnerability.
 Access control ensures only your users and your equipment are allowed on the network.

 Fault and performance management by using web-based interface. Motorola Solutions has internal access to KPIs, but customers have access to data usage.
 Transparent firmware updates. All firmware, configuration changes, and release updates are managed transparently to the user.

The Evolved Packet Core (EPC) is an architectural framework that provides converged data on a 4G Long-Term Evolution (LTE) network.
The 4G LTE EPC provides the following functionalities for the Nitro system:
 User identification (IMSI) and Addressing (MSISDN) mechanisms.
 Mutual authentication between an End User Device (EUD) and a network.
 Security procedures, including confidentiality and integrity protection services for data, and control signaling.
 EUD-to-Network session handling.
 Idle EUD location management services.
 Mobility services.

 Interconnection between EUDs and external packet data networks:
 Customer Enterprise Network by using a Nitro On-Prem Edge Gateway.
 Public School Network via connection with Customer Enterprise Network.
 Public Internet by using an Internet Gateway in the Nitro Cloud.

The Nitro™ Cloud Provisioning Portal is a browser-based application that enables customers to interact with the Nitro network.
The Portal enables the following functionalities:
 Monitor and troubleshoot system components.
 Configure system components.
 Manage system components.
 View status of system components.
 Configuration functions allows network infrastructure and devices configuration.
 Fault management functions allow to do the following:
 Check the general information network infrastructure and devices.
 View the historic events related to network infrastructure and devices.
 Subscribe with your email to receive email on critical events.
 Performance management functions allow to view data usage per CBSD or SIM.
 Data usage shows how much data is being used, to determine if the backhaul is size properly or if CBSDs are over capacity.

Site Infrastructure
CBSD – SLX 5000
SLX 5000 is a next-gen easy to install CBSD for outdoor deployments.
Specifications:

CBRS Band operation (3550-3700 MHz)
Dual carrier operation (2x20MHz)
4G LTE Speeds
2x 2T2R
100W EIRP
External Antenna Support
Power: -48V DC / 40W
128 Active UEs
Ethernet and SFP Cage
FCC certification
21Lbs (9.5kg)
 Chassis – 9.8” x 9.8” x 2.7” (250 x 250 x 70mm)

Each base station site will be outfitted with a Layer 3 Nitro Managed Router that will interface to all other sites and the data center. In locations where climate controlled facilities are not available, Motorola will provide a hardened Layer 3 appliance at no extra charge.

Construction and Engineering

The proposed solution comprises of the following components, which will be installed as detailed below:
CBSD (Citizens Broadband Radio Service Device) – This device will be installed at each of the proposed facilities on the proposed monopole structures. Each location will need to allow for one fiber pair run for every CBSD unit, between the network rack inside the building and the CBSD mounted on the tower/roof. It is assumed that an existing pathway is present (as defined in the SOW) to run this cable at each facility. Each facility may have multiple CBSDs based on size of the facility and coverage being provided from that location.
Network Rack – Each location will have at least one switch and in some cases additional networking gear. It is assumed that this equipment will reside in an existing electronics/network rack at each location.
Customer Premise Equipment (CPE) – Motorola will provision all CPE equipment in conjunction with the customer and provide training on CPE provisioning if requested.

Site Scope Summary
- Engineering services for site drawings
- Typical Permitting
- Engineering Review of proposed tower embedment
- Provide and install new tower to be used for antennas- approx. 78’-0” (60’-0” AGL) direct embedded metal pole or similar
- Provide and install antenna system and NEMA enclosure for power supplies

Vendor Qualifications

Motorola Solutions is a telecommunications company founded in 1928 and headquartered in Chicago, IL. Motorola is at the forefront of the wireless voice and broadband industry, providing solutions to government and enterprise customers. With more than 90 years of experience serving municipal works and public safety agencies, Motorola is the world’s leader in building complex, large-scale solutions like the one that the City of Mesa needs.
Based on our success and commitment to innovation, we were awarded a contract for the world’s largest private LTE network in 2014. We have deployed Nitro systems across the United States, including Harris County, TX, San Antonio, TX, Patterson, CA, Pittsburg, KS, and City of Columbus, OH. This means that we are uniquely positioned to design and deliver a successful, scalable broadband LTE solution for the City of Mesa.
Our plan is to use the expertise and lessons learned from this experience to design and build your new network as quickly and cost-effectively as possible. And once the solution is in place, the City of Mesa can trust that our locally based team of engineers, technologists and service personnel will continue to partner with you in keeping it up and running.

Project Budget

[redacted]

Documentation of Commitments

Council report confirming commitments attached to email.

Resumes of Key Personnel

Attached to email

Maps

Attached to email

From: [redacted]
To: Teri Orman
Subject: RE: City of Mesa & Sun Corridor - eligibility review
Date: Friday, February 11, 2022 3:16:15 PM
Attachments: [redacted]

Census tract list:

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