

Proposal Response

Red Rover Ltd and Huawei Enterprise
For

RFI 8349-0-2014/KS
November 17, 2014

Bridgin the Digital Divide for Under-
resourced Neighborhoods

ATTENTION TO:

City of Madison Purchasing Services
Room 407, City County Building
210 Martin Luther King Jr. Blvd.
Madison, WI, 53703-3346
Kathy Madison

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Tab 1- Company Profile

Red Rover Ltd:

Red Rover Ltd. is excited to introduce the City of Madison to our capabilities of Storage, Network, Security and Consulting expertise. Red Rover Ltd. is positioned to provide the scale, scope, and knowledge to address individual business issues by providing best of breed solutions targeted to specific challenges. We have deep functional and industry expertise as well as a breadth of geographical reach. Red Rover Ltd. is a team of professionals with product expertise to support current and future customer requirements.

Today, as a reseller of top industry-leading companies, Red Rover Ltd. supports storage product solutions, network, security and storage for a variety of projects from infrastructure IT to high performance products for midrange and enterprise market. Current capabilities include system design, development, and consulting services.

Our clients include fortune 100 companies such as Toshiba, Symantec, Motorola and Raytheon. We focus on enterprise and mid-market customers. We have experience in working with state, local and higher education clients.

Red Rover has partnered with Huawei Enterprise to develop the tender response. Red Rover is a Huawei Authorized Reseller and will be proposing a Huawei based solution along with Huawei implementation services.

Red Rover Ltd. is a Nevada based company

Founded in 1998

Red Rover has 6 employees and augments it staff using consultants based on the requirements of the engagement.

www.redroverltd.com

Red Rover is listed as a Small Business under Small Business Administration (SBA)

Huawei

Huawei is a leading global ICT solutions provider. Through our dedication to customer-centric innovation and strong partnerships, we have established end-to-end capabilities and strengths across the carrier networks, enterprise, consumer, and cloud computing fields. We are committed to creating maximum value for telecom carriers, enterprises, and consumers by providing competitive ICT solutions and services. Our products and solutions have been deployed in over 140 countries, serving more than one third of the world's population.

By leveraging our strong R&D capabilities and comprehensive technical expertise, Huawei's strategy in the enterprise domain focuses on close cooperation and integration with partners to deliver a wide range of highly efficient customer-centric

ICT solutions and services that are based on a deep understanding of customer needs. In line with our strategy, we offer a broad portfolio of innovative ICT solutions that cater to global vertical industry and enterprise customers across government and public sector, finance, transportation, energy, large enterprises, and small and midsize enterprises (SMEs). Our portfolio covers enterprise networking, unified communications & collaboration (UC&C), cloud computing & data center, enterprise wireless, network energy and infrastructure services.

Looking ahead, we are committed to serving as the most innovative and optimal ICT technology partner for global enterprises, accelerating their ICT development and improving their operational efficiency. We will work with our global enterprise customers and partners to jointly embrace the challenges brought about by ICT transformations, build a favorable industry ecosystem, and promote the sound development of the ICT industry and society at large.

Huawei revenues are **\$40B** USD annually
150,000 Employee worldwide
16 R&D centers worldwide
Operates in over 170+ countries
Over 140 countries use Huawei technology within the public sector
5 of the top 10 banks use Huawei systems
Huawei is the number 1 telecommunication equipment provide to Carriers.

Resources and Qualifications:

Steve Rovarino

Red Rover Ltd - Equipment Provider and Project Manager

Contact information above.

Qualifications:

25 years in the Storage and IT industry. Worked for companies like Lockheed Martin, Quantum Corp, Netapp. Holds a BS in Engineering and an MBA. Career includes operations management, purchasing management, project management, quality control, business development and sale/marketing. Steve is current the principle operations and GM for Red Rover Ltd.

- www.linkedin.com/in/steverovarino/

Antony Harris

Red Rover Ltd - Engineering Design/Architecture

Tel: 775-636-2577

Email: antony@redroverltd.com

Qualifications:

25 years in the storage and IT industry. Designed and developed his own storage solution for market specific requirements and needs. Degree in Physics and holds a patent for sequence of data files. Antony's career includes engineering and code development, product management of storage solutions and file systems. Antony also offers consulting services for system optimization and design.

- www.linkedin.com/pub/antony-harris/1/287/ab9

Steve and Antony have been involved with the three reference clients. They are also actively involved with a \$10M optical network refresh for Raytheon Applied Signal. Their work with contractors like Lockheed Martin provided complex project management and deployment requirements for the federal government.

Our clients include the following:

University of Nebraska, Lincoln

Holland Computing Center

Project Award Date: Jan 28, 2014

Scope: Deployment of 28 computational servers

Project was completed as a fixed price contract and completed on-time and with zero failures.

Contact: Claudette Biskup

Tel: 402-472-5178

Email: claudette.biskup@unl.edu

ARRIS – Formally Motorola Mobility

Project Award Date: Jan 2013 – ongoing phased deployment

Scope: Deploy a series of core chassis based IP networking switches and top of rack switches. Deployment also included servers for log generation.

Project was completed as a fixed price contract. It was completed on-time. Scope required hands on engineering support and product design/configuration.

Contact: Aviu Braslavski

Tel: 408-235-5904

Email: Aviu.Braslavski.arrisi.com - preferred method of contact

Michigan State University

High Performance Computing Center

Project Award Date: Oct 2012

Scope: Red Rover deployed 1PB (petabyte) of NAS servers and Storage within a replicated environment across two facilities on campus. This system was to support campus wide research, replicated to a DR location for constant data protect.

Project was completed as a fixed price contract and was completed within the timelines specified on the tender.

Contact: Greg Mason

Tel: 517-353-8666

Email: Gmason@msu.edu

Los Angeles Community College District (LACCD)

Project Award Date: 2012

Scope: Red Rover deployed a Huawei storage array (S2600T) to the LACCD within their IT department for general IT application. It has been in constant live production.

Project was completed as a fixed price contract and was completed within the timelines specified on the tender.

Contact: Jorge Mata

Tel: 213-891-2034

Email: matajc@laccd.edu

Other references available upon request including Crawford and Pasadena Independent schools districts, University of California San Francisco and Michigan University.

Tab 2 – Technical Information

Red Rover working with Huawei Enterprise would like to propose the City of Madison consider the adoption of a city deployed private eLTE cellular network. Cellular networks offer the City numerous benefits over a more traditional fixed wired based system.

The LTE products Huawei has offered to this project are field-proven products that have been used in the largest global LTE project. These LTE products are easy to install and maintain, adaptive for quick network build-out.

Video on eLTE Solutions (Educational)

<https://www.youtube.com/watch?v=It0BPUEUwME>

Customer Benefits

Multiple Application Deployment. With an eLTE network, the city can expand coverage to support, Government operations, access on public transportation (Bus or Train), in addition to servicing an expanded area for under-resourced neighborhoods.

The proposed solution supports desktop computers, mobile devices (smartphone, tablets, and laptops) and any device that is either WiFi connect or with has a accessible USB port.

No hardwired infrastructure required to be installed on the specific buildings to provide end point service. Reducing service outages, and maintenance requirements.

Huawei has several poof points including a city wide deployment via Northern Michigan University (Michigan) and Pasadena Independent School District (Texas) has deployed private eLTE networks leverage either existing spectrum or FCC educational discounted spectrum to service their students and facility. The ability to provide WAN internet access to all students regardless of their location or access to

commercial networks was critical to educational equality. Both institutions used available grants, and a subsidized bill back program to offset the cost for deploying the network.

Broadband

In order to simplify the operation process, one network with high broadband to support multi-service is required. Huawei eLTE broadband access solution can support downlink data rate up to 110Mbps, and 38Mbps uplink, it can provide HD video surveillance, remote data acquisition, and broadband data access in one network, and this make it possible for Madison to improve their operation efficiency, and enrich people's life.

While the RFI intent is for assisting local citizens, the infrastructure of the network can be used for other data network purposes. Emergency, civil and security services could consider the use of the network to monitor equipment, video or communications for the city. Further, the network could be lease back to commercial users who need network access but lack the infrastructure to deploy solutions in select areas.

Fast

Nowadays, with development of public transportation technology, more and more metro trains and rapid transit buses have been put into service. Huawei eLTE broadband access solution can support high-speed coverage extending the possibility of offering a cost effective WAN network access on the public rapid transit system. Because of this high-speed coverage, the city can, improve passenger's travelling experiences and explore new revenue streams: for example online advertisement.

Far

Although broadband service is necessary to improve the operation efficiency, it is hard to deploy over wired networks in remote areas, or under serviced locations. Huawei eLTE broadband access solution with ultra-long-distance coverage up to 100km will solve the problem. The downlink rate up to 110Mbps and uplink up to 38Mbps will improve the customers' operation efficiency and saves cost. The frequency used has a direct link to the distance serviced. Lower frequencies provide further range then does higher frequency.

Full Frequency Bands, Flexible Deployment

For many frequencies are allocated to mobile operators in many separate areas, it's important for industries to be able to adapt to different frequencies. Huawei eLTE broadband access solution provides wide frequency bands, including 400M/800M/1.4G/1.8G/2.3G/2.6G/3.5G/3.7G, for a variety of markets. Users can select one or more frequency products, according to their specific needs. In some situations, Huawei can customize the frequency for the customer.

If the City of Madison does not currently own spectrum, the FCC has programs for

cost reduced spectrum for educational needs. The 2.5GHz Educational Broadband Service (EBS) for US Regions and Communities is one such program.

Flexible deployment

Huawei eLTE core networks are especially designed for government and educational markets. Specifically, they can save installation space, ease and speed of deploying their networks, and make network operation & maintenance easy and simple.

Works in harsh environment

Different from normal consumer market, industrial-working conditions are invariably harsh and complex. In compliance with IP67, most devices of eLTE broadband access solution deployed on-site can be kept under 1m water for 30 minutes. Especially, the explosion proof EP680 Ex can be used in Zone 1 and the working temperature of CPE eA660 is -40~65C, this means it can work normally even in the extremely temperature of desert and arctic circle.

Highlight of LTE Technology and eLTE™ Solution

LTE, an acronym for **Long-Term Evolution**, commonly marketed as **4G LTE**, is a standard for wireless communication of high-speed data for mobile phones and mobile data terminals. Based on the GSM/EDGE and UMTS/HSPA network technologies, LTE increases the capacity and speed using a different radio interface called OFDMA together with core network improvements. The LTE standard is developed by the international standardization organization 3GPP (3rd Generation Partnership Project).

LTE is the natural upgrade path for all of the 2G and 3G mobile networks, and is, therefore, expected to be the first truly global mobile phone standard. It is becoming the most dominant mobile broadband network technology worldwide.

As the global LTE network equipment leader, Huawei Enterprise designs eLTE™ solution dedicated for enterprise customers. eLTE stands for “Enterprise LTE” or “Enhanced LTE”. The eLTE solution provides our customers with the following features.

A Powerful Network with Ultra-Wideband and Outstanding Performance

- **High data rate with macro coverage.** With the 20 MHz bandwidth, the max downlink and uplink data transmission rates can reach 110 Mbps per cell and 38 Mbps per cell, respectively. In TDD-LTE, the uplink/downlink timeslot ratios can be adjusted to meet the bandwidth requirements of various services.

Benefits for customers: A single network provides a variety of services:

Broadband Internet access

High-definition video surveillance

Real-time remote data collections from fast moving vehicles

- **Super high capacity at one site.** A BTS at one site is able to handle max 18 cells, 1.5Gbps data throughput, and 10,000 connected users.

Benefits for customers: provide high data rate broadband access to hundreds of thousands of users with merely a few numbers of towers/building roofs. Save CAPEX and OPEX in the infrastructure deployment.

Large Cell Coverage and High Speed Movement

- **The coverage radius of a cell may reach several miles,** depending upon the tower height and frequency.

Benefits for customers: much less number of towers. Save CAPEX and OPEX in the infrastructure deployment.

- **Super High Speed Movement:** Stable data connection up to 250 mph with frequency lower than 1.8GHz. Stable data connection up to 150 mph with frequency lower than 2.6GHz. Stable data connection up to 50 mph with frequency around 3.6GHz, good enough for school bus communications.

Benefits for customers: only suitable solution for macro cell, outdoor, high speed movement, high data rate, and large user group (72 users/bus) application scenario.

An Inexpensive Packet Core with Powerful Capability

- With only one third of the price of a regular packet core, **a compact Packet Core** is able to support 200,000 users, 40 Gbit/s traffic, and 1,500 BTS.
- With only one eighth of the price of a regular packet core, **a mini Packet Core** is able to support 5,000 users, 2 Gbit/s traffic, and 50 BTS.

Benefits for customers: Save investment on Core hardware equipment and installation after the initial phase.

A Professional Network Tailored for Private Network Applications

- Supports **hardware encryption** from user device to BTS. The key is 256 bits long.

Benefits for customers: Supports high security protection for message contents from being invaded, intercepted, or tampered with.

- **Multi-level redundancy configuration:** The redundancy may be configured of boards, devices, and systems, to ensure the secure running of the network.

Benefits for customers: Prevents single-point failures and improves network reliability with right redundancy design.

- The BTS supports **multiple frequency bands**, depending upon the need and availability of a customer.

Benefits for customers: Once a customer acquires more spectrum licenses in the future, the network can be expanded to the new spectrum without additional hardware.

- **UE management:** The network management system manages the Packet Core (EPC), BTS (eNodeB), and User Entity (UE) to simplify network maintenance operations.

Benefits for customers: The network management equipment can remotely manage various UEs in real time. It significantly reduces the network maintenance cost.

Flexible Choices of User Entity (UE) types for Application Scenarios

- Weather-proof outdoor CPE are the proper solution of the vehicle mount and roof-top mount hot spot application.
- Small, portable Mobile WIFI devices are suitable to individual and family uses.
- With suitable spectrum, more types of devices can be connected into the network, such as smart phone, iPad, laptop computer, etc.

Architecture Design

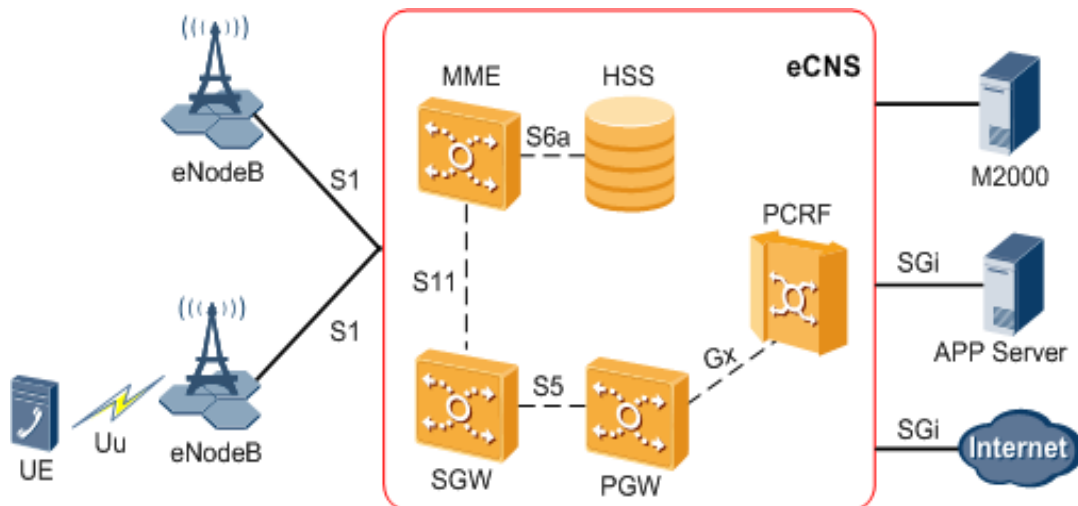


Figure 1 Huawei eLTE Solution Architecture

Huawei eLTE solution architecture is composed of three layers: terminal, network and application.

The terminal layer provides full perceive of real time data from users. The LTE based wireless network layer provides seamless network integration capability for the hybrid real time data. The industry leading distributed eNodeB provides RF coverage and wireless access. The eCNS packet core provides all of the networking functions and user management.

To realize the potential of accumulated “Big Data”, the application layer combines all the VOIP, video, dynamic data, static data from hybrid application system.

Support Services

Huawei has a support center that operates 24x7 located in Plano Texas. The services provides options for onsite engineer service to replace or correct any hardware fault. Since the deployed system is carrier grade, reliability of the system is rated at 99.9999 uptime. Any replacement parts are held at a local fed ex depot for rapid deployment. Local engineers will be dispatch for replacement as required.

Huawei being the number one world-wide telecommunications provider, they have an ongoing roadmap of all products. With eLTE being the standard for US cellular service, the proposed solution is trust in the industry.

Tab 3 – Potential Service Area

The service potential is determined by the antenna network. Antenna can be placed in the specific neighborhoods as indicated in the RFI. Additionally the service area can be expanded by the addition of incremental antenna located in specific locations at less cost, expense and interruption then with hardwired solutions.

The density of the neighborhoods simplifies the antenna deployment. In many cases a single antenna should be sufficient to cover the area. Equally as important is the location of the cities fibre network in proximity of the structures. Brentwood would require special review as it is the only location a few blocks from the closest fibre link.

Additional antenna's can be deployed such that the entire area of Madison proper could be covered with a City own private eLTE network. If the Madison Metropolitan School District and University of Wisconsin, Madison should also like to engage on the project, the coverage could easily to expand across most of the key demographic areas of the city.

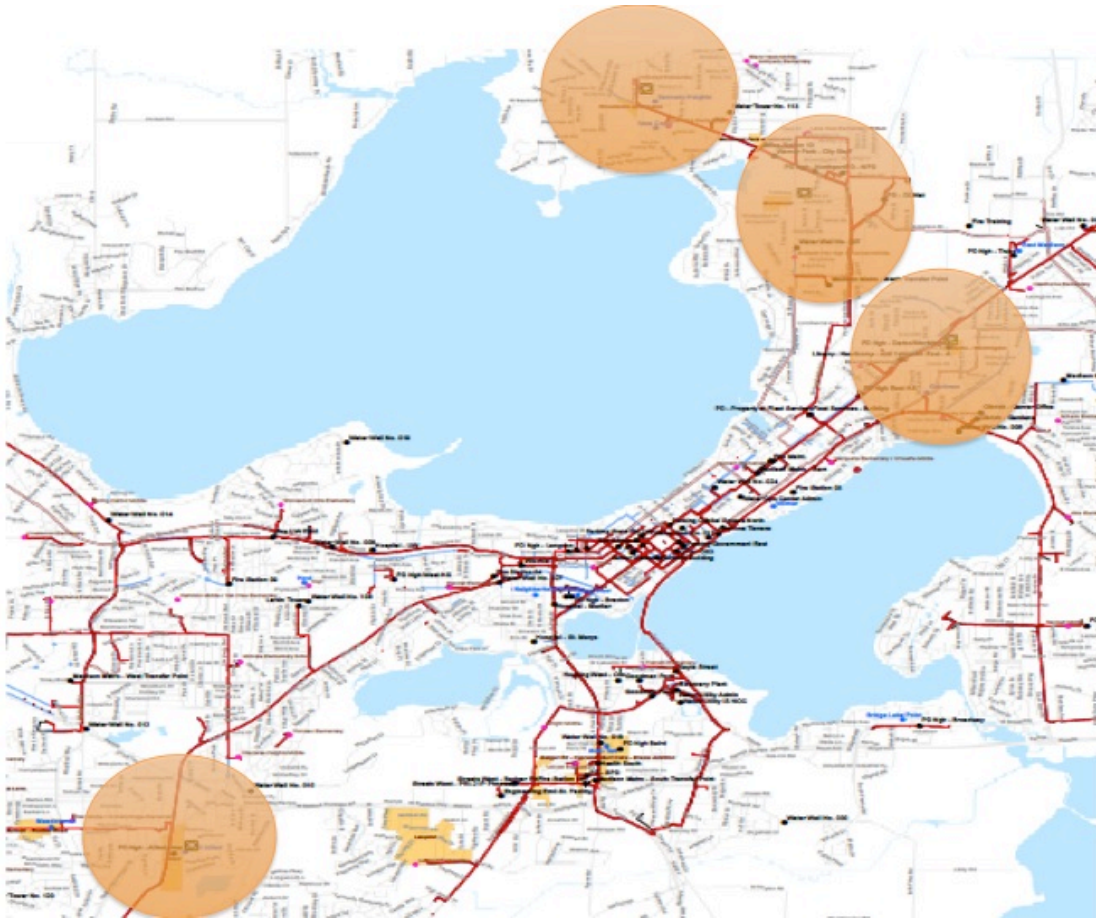


Figure 2: Estimated Coverage Area

Based on the range of each antenna, the city would provide a larger coverage area beyond the immediate structures. The map is an estimate of the coverage area. Actual coverage size would depend on frequency and physical obstructions (tall buildings for example). As the city adopts the deployment, incremental antenna can be installed to expand the service to other regions or areas of need.

Tab 4 - Pricing Model

The consideration of a private eLTE network changes the common pricing model from one of that with a “per user” pricing structure. The pricing model is split between a base infrastructure and variable costs. The variable components related to the area over coverage, number of users, and bandwidth. By offering expanded capabilities, scalability, enhance services and larger citizen coverage, a higher-level discussion would be necessary to properly provide a more accurate pricing point.

An entry system starts at around \$250K. The cost changes based on the geographical coverage area, spectrum available and number of users. The cost for such a solution can be offset by federal grants, a bill back from users of the system, up to and including, the possibility of lease back for commercial needs. For example, the building orders could consider adopting CCTV systems for enhanced security leveraging the cities LTE network for network connectivity.

Since the City would own the infrastructure the ability to provide access to more citizens comes at a lower price point. The City may want discuss this option with the Madison Metropolitan School District or the University of Wisconsin, Madison . The school district may find additional value of including a few of their school locations or neighborhoods where access to internet is lower then the average. We have seen schools providing low cost chrome books to students who do not have proper computer infrastructure to success in their classes. This is what the Pasadena Independent School District is deploying in Texas. The University may find value in sharing the infrastructure to provide private network access for their students and facility. This is how the awarded Northern Michigan University enhanced their access for students.

Equipment Overview

Name	Product Description	Product Model
Evolution Packet Core (EPC)	Compact core, integrating mobility management, data switching, and user management into one box.	eCNS600
NMS	Network Management System. Monitors all Huawei equipment	M2000
eNodeB	Distributed Base Station (BTS). Each has 1 BBU and 3 RRU.	DBS3900
BTS Antenna	Directional antenna, 18dbi	
GPS Antenna	Used for synchronization among BTS	
Outdoor power cabinet	Contains BBU, AC/DC power and optional battery	APM30H
UE	Outdoor LTE CPE with weather proof box and POE. Indoor LTE CPE supporting Band-43. Both provide 2.4GHz b/g/n Wifi to end users.	Outdoor eA360, indoor B5142. The number of each type is to be determined after site survey.

Attachment A - Vendor Data Sheet

Vendor Name: Red Rover Ltd
Address: 748 South Meadows Parkway Suite, A9-52
Reno, NV 89521

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Title: President

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Email Address: steve@redroverltd.com

Signature:

End of Proposal