Private 5G Networks for State and Local Government

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What is Private Wireless?

“Shared” spectrum – uses the same equipment and features as mobile carriers

Lots of bandwidth! Up to 1GB speeds per radio

4G LTE, Moving to 5G in 2021

Anyone can build – critical that customers have power, fiber, and ‘right of way’ to hang radios

Dell and JMA have all the tools to deliver Private Wireless to customers
**DENSE URBAN**

- Ecosystems / I4.0
- 1-2 msec
- +10 Gbps
- Small Cells / Fiber
- vRAN
- Very High

**URBAN**

- MONETIZATION
- LATENCY
- CAPACITY
- DENSIFICATION
- RAN STRATEGY
- IOT DEVICE DENSITY

**SUBURBAN**

- Residential / SB
- +10 msec
- +100 Mbps
- Macro Towers
- D-RAN
- Low

**RURAL**

- 5G
- Digital Growth
- Cost Management
- LTE
- Digital Growth
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- Digital Growth
- Cost Management
- LTE

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**SPECTRUM**

- mmWave
- Sub 1GHz

**LATENCY**

- 1-2 msec +10 msec

**CAPACITY**

- +10 Gbps +100 Mbps

**DENSIFICATION**

- Small Cells / Fiber vRAN

**IOT DEVICE DENSITY**

- Very High Low
Dell Technologies and JMA Wireless Help Solve the Digital Divide for Tucson, AZ

OVERCOMING DIGITAL EQUITY CHALLENGES:
• How to provide internet access to disadvantaged neighborhoods
• A completely wireless solution was needed to accommodate all residents
• Impossible to deploy and maintain approx. 20,000 WiFi hotspots over 70 miles
• In order to leverage CARES Act funding, needed a product solution vs. a service

ADVANTAGES OF THE JOINT SOLUTION:
With advanced 4G/5G cellhubs from Dell and JMA Wireless, the city was able to:
• Cover the same 70 mile area with only 80 cellhubs
• Gain 50MB internet speeds within the extended 4G LTE range and up to 100MB connections for a smaller 5G circle
• Offer a more secure network to approved applicants with rugged 4G/5G to WiFi devices provisioned with city-supplied SIM cards
• Dramatically reduce deployment costs as each Dell server supports 4 hotspots

WHAT’S NEXT FOR THE CITY OF TUCSON:
• The city is in the process of deploying 40 cellhubs and will expand further in 2021
• Over 2000 applications received from families in need of internet connectivity
• Extend utility to other city services to further reduce spend on external carriers
• Connectivity is now in place to be able to deploy “smart” devices
Private Wireless Concept

A private 5G network is placed on or near the school's building to create a new network that connects to the school's existing network.

A private 5G enabled device inside a bus receives the signal directly from the school's network and converts it to Wi-Fi. It can also wire directly to other applications (i.e. security cameras).

An indoor gateway receives the signal directly from the school’s network and converts it to Wi-Fi.

An outdoor receiver captures the signal from the school's network and sends it to an indoor gateway that converts it to Wi-Fi.

Monitors the school’s wireless network, all connected gateways and private 5G network enabled devices. Data stays local to the school’s network to ensure control.
Example – Private Wireless Urban Overlay for Remote Learning

Customer Provided Indoor Rack Location

**City Provides Fiber, Power, Connection Locations**

JMA Private Wireless Software Running on Dell 740

JMA Carrier Grade Radios ~12-15 radios covering 100 blocks
Simple Architecture
JMA CBRS Private Network Solution

**CBRS VRAN**
- CBRS Wireless built in 100% Software
- Results in Extreme Flexibility
- Uses Standard Off-the-Shelf Server Technology
- Can Bridge to Multiple Networks
- Supports 10,000s of Connected Users/Homes
- Supports both 4G and 5G Devices

**CBRS Radios**
- Designed for Outdoor and Indoor
- Designed to Enable Maximum Bandwidths
- Can Enable All of CBRS 150MHz
- Deploy as Needed for Persistent Service
- Use Different Antennas for Coverage
- Designed for both 4G and 5G

**CBRS Antennas**
- Small Footprint for Clean Look
- Multiple Beam Options for Maximum Coverage
- Can Enable All of CBRS 150MHz
- Designed for Outdoor Pole Mounting
- Indoor Versions also Available
- Matched with JMA Jumpers for Best RF
Design for Scale and Easy Orchestration

Central Operations Tools
• Centralized operation
• Web-based, simplified tools
• Open NBI (3GPP SOAP)

Flexible Software CBRS
• Software-based CBRS Baseband
• Flexible channel configurations
• Data Center or On-premises
• Direct to EPC Core (S1)

Multiple Radio/Antennas
• Radio options for different use cases
• Indoor & Outdoor (CBSD Cat A and B)
• CPRI and Ethernet ORAN 7.2
• Future integrated unit (indoor/outdoor)

One XRAN supports up to 36 radios
5G Communications Head

**Headend Hardware Components**

- Grand Master Clock / Remote Access Device
- Management and Access Switch
- Multi-Access Edge Compute
- Backhaul/Midhaul Switch
- Radio Access Network Servers
- Fronthaul Switch
- Fiber Distribution
- Radio Power Distribution
- Uninterrupted Power Supply and Conditioning

**Software Services**

- Security and Firewall
- Packet Core Server
- User Plane Functions

**Radio Hardware**

- 5G Virtual Radio Access Network
- ... to 5G FR1/FR2 Radio Access Network

- CellHub Midband FR1 Radio
- IOTA mmWave FR2 Radio
Sample CBRS Coverage Study
Beaver Avenue Parking Deck Only

- 200’ Rad Center
- 0.59 mi Coverage Radius
- 1.09 mi² Coverage Area
Pugh Street Parking Deck Only
HERE at State College Only
Beaver Avenue and Pugh Street Parking Decks
Beaver Ave Parking Deck and HERE (Optimal)