Verizon/Florida Association of Counties

Network Presentation & Public Safety and Cyber Security

July 8, 2020

2PM to 3PM

Troy M. Dunning - Facilitator
Manager Business Development & Strategic Planning
Network Real Estate
Temple Terrace, Florida
<table>
<thead>
<tr>
<th>Topics</th>
<th>Owner/s</th>
<th>Time</th>
<th>Meeting type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introductions</td>
<td>ALL</td>
<td>5 min.</td>
<td>Discuss</td>
</tr>
<tr>
<td>2. Government Technology</td>
<td>Ryan Lopez</td>
<td>20 min.</td>
<td>Discuss</td>
</tr>
<tr>
<td>3. Small Cells</td>
<td>Jay Bidlack</td>
<td>10 min.</td>
<td>Discuss</td>
</tr>
<tr>
<td>4. Smart Cities</td>
<td>Crystal Chubeck</td>
<td>10 min.</td>
<td>Discuss</td>
</tr>
<tr>
<td>5. 5G</td>
<td>Troy M. Dunning/Michael Buerki</td>
<td>5 min.</td>
<td>Discuss</td>
</tr>
<tr>
<td>6. Closing/Thank you</td>
<td>Troy M. Dunning</td>
<td>5 min.</td>
<td>Wrap Up</td>
</tr>
</tbody>
</table>
Government Technology

Ryan Lopez
Manager Solutions Architect
Government Sales
Central Florida
407-595-5044
ryan.lopez@vzw.com

Topics
Remote Worker/Distance Learning
Cyber Security
Disaster Recovery /COOP
Public Safety Priority & Preemption
Verizon One Talk Keeps You Connected Even When Away.

- Smartphones Native/Enhanced Dialer
- Mobile App iOS and Android®
- Desk phones Desk, conference and cordless
- Desktop App Windows® and Mac® OS
- Hunt Group
- Auto Receptionist
Distance Learning

ANYTIME, ANYWHERE ACCESS
Portable, filtered Wi-Fi hotspots and embedded devices connect student outside the classroom. You choose the device and Education Broadband™ data plan that is right for you.

CHOOSE HOW STUDENTS CONNECT
SmartSpot®  Chromebook Bundle  Embedded Device
Cyber Security

2020 Data Breach Investigations Report

Stay ahead of threats with insights from 3,950 confirmed breaches.

View the DBIR online

Download the report

Explore Analysis Summary Industries Data tool Resources Archives
Device Security

Mobile Device Management (MDM)
Enterprise Device Management
Bring Your Own Device (BYOD)
Mobile Threat Defense
Mobile Application Security
Windows Device Management
Unified Endpoint Management (UEM)
Content Filtering

IBM MaaS360 with Watson
ASAVIE
Lookout
MobileIron
Samsung Knox
Google Zero Touch
Android Business Manager
Txt Archiving

Mobile Security & Policy
HIPAA
CJIS
CIPA
Deploy & Secure

Verizon MDM Hotspots

Verizon confidential and proprietary. Unauthorized disclosure, reproduction or other use prohibited.
Secure Private Networks

Figure 3: Dynamic Mobile Network Routing

DDoS Shield | DNS Safeguard | VNS-Security | Software Defined Perimeter (SDP)

Verizon confidential and proprietary. Unauthorized disclosure, reproduction or other use prohibited.
We run to a crisis, not away.

We’ve earned the trust of our public safety partners by providing mission-critical responses to help agencies deliver when it matters most.

98% | During Hurricane Harvey, 98 percent of our network remained operational.

97% | During Hurricane Florence, 97 percent of our network remained operational at our lowest service level. Restored to 99% within 48 hours.

https://www.verizon.com/about/news/hurricane-florence-network-updates

Verizon is a true partner. We can help you maintain and restore vital services and protect lives with our proven platforms, solutions and connectivity.

Verizon Public Safety Response Team
24/7 Hotline – 1-800-981-9558

1 “Hurricane Harvey by the numbers,” Verizon internal research, November 2017.
http://www.verizon.com/about/sites/default/files/HarveyFinal11117.pdf
Verizon Connect

Verizon Connect allows you to operate more efficiently utilizing a variety of products that bring many benefits to your organization.

- Locate valuable assets during critical times
- Improve driver behaviors with Integrated Video
- Improve driver safety with automated pre & post trip inspections
- Automate vehicle maintenance scheduling and improve vehicle health
- Simplify job management, scheduling and dispatching, and improve communication between technicians and dispatchers
### Verizon Public Safety Product

<table>
<thead>
<tr>
<th>Available Today</th>
<th>Coming Soon</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Private Core</strong></td>
<td><strong>Applications</strong></td>
</tr>
<tr>
<td>Dedicated Public Safety Core</td>
<td>Developer Program App Store</td>
</tr>
<tr>
<td>No Additional Charge</td>
<td>Critical Communications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Priority &amp; Preemption</strong></th>
<th><strong>Deployables</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled Preemption &amp; Priority</td>
<td>Mobile Connectivity Trailer</td>
</tr>
<tr>
<td>No Additional Charge</td>
<td></td>
</tr>
</tbody>
</table>

---

**We deliver the public safety promise**
A Thank You for Those Who Serve

Contact us with any questions:

Ryan Lopez
407-595-5044
ryan.lopez@vzw.com
Small Cells

Jay Bidlack
Senior Manager
Network Real Estate
Temple Terrace, Florida
Connecting our homes, businesses and communities.
Why are we expanding the wireless network?

More people than ever before rely on wireless connections to manage their lives and businesses.

Verizon is expanding its wireless network to meet the growing demands of today and tomorrow.

But it takes time.

The average North American smartphone user will consume 48 GB of data per month in 2023, up from just 5.2 GB per month in 2016 and 7.1 GB per month in 2017.¹

Of American homes are wireless only.²

In North America, the average household has 13 connected devices with smartphones outnumbering tablets 6 to 1.³

---

1. Ericsson Mobility Report, November 2017
2. CDC’s 2018 Wireless Substitution: Early Release of Estimates From the National Health Interview Survey, July-December, 2018
What it takes to keep families and businesses connected.

How does wireless service work?

Radio frequencies can carry signals from radios and televisions, to baby monitors, garage door openers, home Wi-Fi service, and cordless phones.

Cell service uses these radio frequencies to wirelessly connect a mobile device with the nearest antenna. That antenna may be hidden in a church steeple, sitting on a rooftop, attached to a building façade or mounted on a freestanding tower structure. All are known generically as cell sites.

From the cell site, the call or data session then travels through a high-speed connection to a network switching center where it is then directed to the recipient.

This all happens in fractions of a second.

The many types of wireless technologies include cellular and fixed wireless, or Wi-Fi.
Different locations require different solutions.

Verizon uses a balanced approach to engineering the best possible network given the local community’s needs.

Traditional, or macro cell sites, are most often the best choice for meeting coverage and capacity needs. Macro sites are traditional cell sites or towers that provide coverage to a broad area, up to several miles.

Small cells are just like the name implies – short range cell sites used to complement macro cell towers in a smaller geographic area ranging from a few hundred feet to upwards of 1,000 feet. These lower power antennas enhance capacity in high traffic areas, dense urban areas, suburban neighborhoods, and more. Small cells use small radios and a single antenna placed on existing structures including utility poles and street lights.

Distributed Antenna Systems (DAS) are a group of antennas in outdoor or indoor locations that connect to a base station. DAS systems are typically used in large venues including stadiums and shopping centers.
More wireless traffic needs more wireless facilities just like more vehicle traffic needs more lanes.

- Many wireless users share each cell site and congestion may result when too many try to use it at the same time.

- Wireless coverage may already exist in an area, but with data usage growth increasing exponentially each year, more capacity is needed.

- To meet capacity demands, we need to add more wireless antennas closer to users and closer to other cell sites to provide the reliable service customers have come to expect from Verizon.

In the United States, the gigabyte equivalent of all movies ever made will cross mobile networks every 1 hour by 2022.¹

¹Cisco VNI Mobile Forecast Highlights Tool, October 2019
Finding the right location.

To meet customer needs and expectations, wireless providers need the ability to expand and enhance their networks where users live, work, travel and play.

Verizon gathers information from many sources including customer feedback, results of our own exhaustive network testing, and data from third parties.

When an area for improvement is identified, utilizing our existing network is always our first effort. If that is not possible, we then look at adding a new site.

Steps to finding a new site

Our engineers analyze the areas that need improvement to figure out the ideal location based on customer needs, terrain and modeling results.

Using existing structures is considered first.

Network teams perform exhaustive searches in the area needing improvement to find a location that will meet our technical needs. We also look at interest from property owners.

We pick a location that has the highest likelihood of meeting technical needs and works for the community.

Guidelines for new sites

We comply fully with all requirements for community notification and review, zoning and permitting.

Potential antenna locations must meet all local, state and federal regulations.

Verizon holds Federal Communications Commission (FCC) licenses for the frequencies utilized and we strictly follow their regulations.
Wireless facilities and property values.

Cell service in and around the home has emerged as a critical factor in home-buying decisions.

National studies demonstrate that most home buyers value good cell service over many other factors including the proximity of schools when purchasing a home.

- More than 75% of prospective home buyers said a good cellular connection was important to them.¹

- The same study showed that 83% of Millennials (those born between 1982 and 2004) said cell service was the most important fact in purchasing a home.

- 90% of U.S. households use wireless service. Citizens need access to 911 and reverse 911 and wireless may be their only connection.²

¹ RootMetrics/Money, The Surprising Thing Home Buyers Care About More than Schools, June 2, 2015
² CTIA, June 2015
Health and safety background.

Health and safety organizations world-wide have studied potential health effects of RF emissions for decades, and studies continue.

Hundreds of times less

RF emissions exposure at ground level is well below Federal Communication Commission limits.

The Federal Communications Commission (FCC) guidelines for operating wireless networks are based on the recommendations of federal health and safety agencies including:

- The Environmental Protection Agency (EPA)
- The Food and Drug Administration (FDA)
- The National Institute for Occupational Safety and Health (NIOSH)
- The Occupational Safety and Health Administration (OSHA)
- The Institute of Electrical and Electronics Engineers (IEEE)
- The National Council on Radiation Protection and Measurements (NCRP)

Wireless technology, equipment and network operations are highly regulated.

More information can be found through these organizations:

Federal Communications Commission Radio Frequency Safety Program:
http://www.fcc.gov/oet/rfsafety/

World Health Organization:

American Cancer Society
Building a wireless network you can rely on in a crisis.

The reliability of your cell phone is never more important than when crisis strikes. That’s when a simple call or text message can make the difference between life and death.

We build reliability into every aspect of our wireless network to keep customers connected when you need it most.

Reliability starts when we choose the safest, most secure locations for our wireless equipment. The likelihood of earthquakes, and risk from wildfires, mudslides, floods, hurricanes and more are all considered.

When disaster strikes, we coordinate with first responders and can mobilize charging stations, special equipment, emergency vehicles and more to support local, state and federal agencies in all 50 states.

It’s who we are.

With over 80% of 9-1-1 calls now coming from cell phones...

911 calls are made annually. In many areas, 80% or more are from wireless devices.

Verizon is part of your community. Because we live and work there too.

We believe technology can help solve our biggest social problems.

We’re working with innovators, community leaders, non-profits, universities and our peers to address some of the unmet challenges in education, healthcare and energy management.

Learn more about our corporate social responsibility at www.verizon.com.
Verizon Pole Designs

4G, 5G, and CBRS
Smart Cities

Crystal Chubeck
Manager Business Development & Strategic Planning
Verizon Business Group
Jacksonville, Florida
Verizon Smart Communities

Creating a positive impact on communities with innovative solutions designed to drive citizen engagement, economic development, and innovation while helping to improve safety, efficiency, environmental sustainability and bridging the digital inclusion.
## Smart Communities strategic technology investments

<table>
<thead>
<tr>
<th>5G and V2I</th>
<th>Lighting infrastructure as a sensor hub</th>
<th>Computer vision</th>
<th>Netsense city data platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomous vehicles connected to city infrastructure and 5G</td>
<td>Existing city assets used as a foundation for new smart-city solutions</td>
<td>Analytics that provide relevant information in a less bandwidth-intensive format</td>
<td>Aggregates data from multiple sources to deliver insights to cities about trends in their area</td>
</tr>
</tbody>
</table>
Verizon offers a comprehensive set of solutions.

- **Lighting**
  - Intelligent Lighting

- **Traffic**
  - Traffic Data Services
  - Intersection Safety Analytics

- **Parking**
  - Parking Optimization

- **Public Safety**
  - Intelligent Video
  - Real-Time Response System
  - Digital Evidence Management

- **Citizen Engagement**
  - Partner Digital Kiosk**

** Offered via referral partner kiosks
5G

Michael Buerki/Troy M. Dunning
Senior Manager/Manager Business Development & Strategic Planning
Central Florida Government Sales/Network Real Estate
Temple Terrace, Florida

Verizon confidential and proprietary. Unauthorized disclosure, reproduction or other use prohibited.
Ultimately, driving the Fourth Industrial Revolution

**First Industrial Revolution**
- Water and steam power
- The work one could do was no longer constrained by that individual’s physical strength or endurance.

**Second Industrial Revolution**
- Electrical energy and division of labor
- Electrical energy means work can be done almost anywhere. Mass production becomes possible.

**Third Industrial Revolution**
- Electronics and information technology
- It becomes possible to offload mental work to machines, allowing businesses to do for thought what had been done for physical objects.

**Fourth Industrial Revolution**
- Cyber Physical Era

First mechanical loom, 1784
First conveyor belt, 1870
First programmable logic controller, 1969
The real-time intelligent ecosystem, 2019
Evolution of Technology

1G
- Analog voice
  - Text messaging
  - Digital voice
  - Security

2G
- High speed data for phones and other mobile devices
- Internet of Things (CAT M)
- Expanding capabilities

3G
- Data & applications

4G
- Ultra-low latency
- Ultra-reliable transmission
- Massive Internet of Things scale
- Security by design
- High bandwidth (Spectrum width of hundreds of MHz)

5G
- High speed data for phones and other mobile devices
- Internet of Things (CAT M)
- Expanding capabilities
- Ultra-low latency
- Ultra-reliable transmission
- Massive Internet of Things scale
- Security by design
- High bandwidth (Spectrum width of hundreds of MHz)
The best network for public safety continues to get better.

Our network is the foundation for the products we offer and our ability to support our partners in public safety. Verizon is committed to remaining the nation’s #1 network.

$180 billion
invested since 2000

Investment

We invest billions of dollars every year to expand our network services and capacity, and to prepare for tomorrow’s even more powerful networks.
5G Launches in Panama City and Hard Rock Stadium in Miami

Design and Implementation of additional 5G markets

Coverage in N. Florida
Capacity in S. Florida
## 5G and Intelligent Edge Benefits (Compared with 4G)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>4G</th>
<th>5G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Billions of Connected Devices</strong></td>
<td>1M connected devices per km²</td>
<td><strong>Wearables</strong></td>
</tr>
<tr>
<td><strong>Increased Mobile Data Volumes</strong></td>
<td>Enables complex applications that require high data volume</td>
<td><strong>Smart parking</strong></td>
</tr>
<tr>
<td><strong>Ultra Lower Latency</strong></td>
<td>Data travel time between nodes is ~1ms</td>
<td><strong>Autonomous vehicle</strong></td>
</tr>
<tr>
<td><strong>Significantly Higher Bandwidth</strong></td>
<td>Allows high rates of data transfer to the end-user (Throughput)</td>
<td><strong>Thin Client/virtual device</strong></td>
</tr>
<tr>
<td><strong>Faster Data Speeds</strong></td>
<td>The amount of data successfully moved from one place to another</td>
<td><strong>4K/8K video streaming</strong></td>
</tr>
<tr>
<td><strong>Long Battery Life</strong></td>
<td>Devices send less control messages to the network, hence consume less power</td>
<td><strong>Wearables</strong></td>
</tr>
</tbody>
</table>

### Sample Use Cases

- Wearables
- Smart parking*
- Thin Client/virtual device
- Autonomous vehicle
- 4K/8K video streaming
- AR/VR
- Autonomous vehicle
- Thin Client/virtual device
- Robotic control
- Drone Monitoring
- Thin Client/virtual device
- AR/VR
- 4K/8K video streaming
- 4K/8K video streaming
- Wearables
- Agriculture*

---

* Indicates respectively

---

Verizon confidential and proprietary. Unauthorized disclosure, reproduction or other use prohibited.
Thank you!