MOVING FORWARD:
BROWARD’S NEW 911 RADIO SYSTEM

May 23, 2018
WELCOME & OPENING REMARKS

BOB SWINDELL
President and CEO - Greater Fort Lauderdale Alliance
NICK FALGIATORE
Radio Technical Specialist – Mission Critical Partners
System requirements and specifications developed based on user-identified needs.

- Needs Assessment - 2015
- User Interviews
- Online User Surveys
• Request for Qualifications – February 2016
• Request for Proposals – May 2016
• Technical Demonstrations – Motorola and Harris Corporation
• Evaluation Committee – included police and fire agencies
• Design review process – Motorola, Mission Critical Partners and Broward County
WHY MOTOROLA –
FROM MCP’S PERSPECTIVE

- Latest Project 25 (P25) Standards
- Largest Number of Talkpaths
- Highest Tier System Core
- Redundant Master Sites
- Redundant Simulcast Prime/Voter Sites
- Redundant Backhaul Connections
- Stand-alone Trunked Backup System
Most Advanced and State-of-the-Art Equipment Available

System Specifications and Functional Requirements:
Mission Critical Partners
Designed and Built By: Motorola Solutions Inc.
Input From: Local Users (Police, Fire, BSO)
DANIEL SANCHEZ
MSSSI Vice President & Director
Florida Government & Public Safety
Motorola Solutions Inc.
ASTRO 25 M3 Trunked Core

- Highest tier system in P25 System Portfolio
- Latest software with new releases annually
- Hardware and software “refresh” every two years
## Scalable platform designed with flexibility

<table>
<thead>
<tr>
<th></th>
<th>Standalone</th>
<th>Express Site</th>
<th>Multisite</th>
<th>Statewide/Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>K-Core</td>
<td>M1/M2-Core</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L-Core</td>
<td>M3-Core</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conventional</td>
<td></td>
<td></td>
<td>Conventional</td>
<td>Trunking</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Site</td>
<td>1 Site</td>
<td>1 – 75 Channels</td>
<td>1 – 5 Sites</td>
<td>Single Zone Up to 24/75 Sites</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 – 150 Sites per zone</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 100 users per channel</td>
<td>Up to 16,000 users</td>
<td>Up to 16,000 users</td>
<td>Up to 16,000 users</td>
<td>Up to 250,000 users</td>
</tr>
</tbody>
</table>
Delivering value to customers

<table>
<thead>
<tr>
<th>THEN: RELEASE ALL AT ONCE</th>
<th>NOW: RELEASE INCREMENTALLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A7.1</td>
<td>A7.17</td>
</tr>
<tr>
<td>A7.17</td>
<td>A7.17.1</td>
</tr>
<tr>
<td></td>
<td>A7.17.2</td>
</tr>
<tr>
<td></td>
<td>A7.17.3</td>
</tr>
<tr>
<td></td>
<td>A7.18</td>
</tr>
</tbody>
</table>
• No system has unlimited capacity
• Every system (conventional and trunked) has trade-offs
• Trunked systems – many more Talkgroups than Channels – 700 Talkgroups and 28 Channels in Broward
• Conventional systems – same number of Talkgroups as Channels – 100 Talkgroups and 100 Channels in NYPD
## WHY A TRUNKED SYSTEM

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Trunked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio channels selected by the user</td>
<td>Radio channels assigned to the user automatically</td>
</tr>
<tr>
<td>No control channel needed</td>
<td>Control channel used in all P25 trunked applications</td>
</tr>
<tr>
<td>Suitable for smaller systems or systems structured for smaller groups of users (e.g. NYC)</td>
<td>Better for larger (approximately 300+) organizations</td>
</tr>
</tbody>
</table>
## Why a Trunked System

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Trunked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call Arbitration</td>
<td>None</td>
<td>Controller-based</td>
</tr>
<tr>
<td>Automatic channel assignment</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Channel Busy</td>
<td>User tries again and again</td>
<td>Auto System Call-back</td>
</tr>
<tr>
<td>Talkgroup to Channel Ratio</td>
<td>1 Talkgroup per Channel (e.g. 100 groups need 100 channels) Prone to more idle airtime on channels</td>
<td>Many talkgroups per channel (e.g. 700 groups can use 36 channels) Higher Spectrum Efficiency</td>
</tr>
</tbody>
</table>
Conventional
As channels grow, the number of users per channel is the same

Trunking
As channels grow, the number of users per channel grows exponentially
Conventional Radio System

- 100+ channels assigned to different City-wide, Borough-wide and Zone-wide groups
- Officers go to channel based on NYPD’s organizational structure
- Command manages large incident response with less than 100 users per channel
• Frequency Availability
• Number of User Agencies
• Agency Operational Requirements
• Flexibility to Grow TalkGroups without Growing Infrastructure
• Security
• Data Functionality
• Backup and Redundancy
Normal Operations in Daily Busy Hour
+
Projected User Growth Over System Life
Communities have different operational environments and radio procedures and system designs must accommodate local needs.
What are the differences between the current system and the new system being implemented?

<table>
<thead>
<tr>
<th></th>
<th>Current System</th>
<th>New System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology</strong></td>
<td>• Proprietary 30-year-old Analog Smartnet Trunking with 3600 baud Control</td>
<td>• Standards-based P25 Digital Trunking with 9600 baud Control Channel</td>
</tr>
<tr>
<td></td>
<td>Channel running 6809 machines</td>
<td>running on modern servers</td>
</tr>
<tr>
<td></td>
<td>• Mixed-mode analog and digital</td>
<td>• Exclusively digital</td>
</tr>
<tr>
<td><strong>Coverage</strong></td>
<td>• 10 sites (8 are Tx/Rx, 2 are Rx-only)</td>
<td>• 16 sites, all Tx/Rx</td>
</tr>
<tr>
<td></td>
<td>• 15 dB Countywide coverage</td>
<td>• 20-25 dB Countywide coverage</td>
</tr>
<tr>
<td><strong>Capacity</strong></td>
<td>27 Talk-paths</td>
<td>36 Talk-paths</td>
</tr>
<tr>
<td>a. Core Redundancy</td>
<td>a. Redundant master sites at single location</td>
<td>a. Geographically separated master sites</td>
</tr>
<tr>
<td>b. Prime Site Redundancy</td>
<td>b. Single prime-site location</td>
<td>b. Geographically separated redundant prime sites</td>
</tr>
<tr>
<td><strong>System Access Security</strong></td>
<td>n/a</td>
<td>ID-based Authentication</td>
</tr>
<tr>
<td><strong>Site Connectivity</strong></td>
<td>T1 &amp; Microwave</td>
<td>Full Microwave dual-loops</td>
</tr>
<tr>
<td><strong>Back-up System</strong></td>
<td>No backup system</td>
<td>4-site, 7 Channel Trunked System</td>
</tr>
<tr>
<td><strong>Data Capabilities</strong></td>
<td>No data-capabilities</td>
<td>GPS Officer Location on PTT, text capable</td>
</tr>
</tbody>
</table>
• Trunking is recommended for larger systems
• FCC requires trunking when using more than 5 frequencies/channels
• Trunking systems have better traffic handling capacity than conventional systems with the same number of channels
• Conventional systems require the right number of the right frequencies (T-band UHF Spectrum)
• Broward has insufficient number of frequencies for a conventional system
DANIEL SANCHEZ
MSSSI Vice President & Director
Florida Government & Public Safety
Motorola Solutions Inc.
• What is Throttling (Control Channel Saturation)?
  – A system protection mechanism designed to handle momentary large level of requests into the Controller
  – Helps prevent the system from crashing

• When & Why Throttling Happens
  – Unusually large number of radio users access the system at the same time
    • Turn on / off
    • Change talk-groups
    • Push-to-talk
The Zone Controller (Master Site) will never go into throttling and will never dissolve a patch (applies to current and new systems).
You Can Make a Difference!

- Follow National Incident Management System (NIMS) and Incident Command System (ICS) Protocols
- Incident Commander Makes and Manages Talkgroup Assignments
- Communications Unit Leader Manages Radio Resources to Preserve System Integrity
- Communications Unit Leader Uses ICS 217A and 205 Forms to Manage Channel Assignments
## COMMUNICATIONS RESOURCE AVAILABILITY WORKSHEET

<table>
<thead>
<tr>
<th>Frequency Band</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Config</td>
<td>Channel Name/Tone</td>
</tr>
<tr>
<td>Rx /&amp;/ or Rx/Rx</td>
<td>Rx Tone/RIAC</td>
</tr>
<tr>
<td>Rx Tone/RIAC</td>
<td>Tx Tone/RIAC</td>
</tr>
</tbody>
</table>

*The convention calls for frequency lists to show four digits after the decimal place, followed by either an “N” or a “W”, depending on whether the frequency is narrow or wide band. Mode refers to either “A” or “D” indicating analog or digital (e.g., Project 25) or “M” indicating mixed mode. All channels are shown as if programmed in a control station, mobile or portable radio. Repeater and base stations must be programmed with the Rx and Ts reversed.*
<table>
<thead>
<tr>
<th>Radio Type/Cache</th>
<th>Channel</th>
<th>Function</th>
<th>Frequency/Tone</th>
<th>Assignment</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>King</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIFC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>King</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIFC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>King</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIFC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Prepared by (Communications Unit)
• Off Duty and Not Responding – Radio Off
  - *Use Alternate Applications Instead* (e.g. scanner or scanner app)

• On Duty and Not Responding
  - *Do Not Change Channel Position Unless Necessary*
  - *Minimize Radio Traffic*

• On Duty and Responding Elsewhere
  - *Critical Radio Traffic Only*
• Each Agency Has a Designated Main Channel
• Outside Agencies Providing Support Incorporate Use of Countywide Mutual Aid Channels
• Use Regional Standard Fleetmap
• Conduct Ongoing Training (no less than annual)
• Perform Ongoing Radio Maintenance to Manufacturer’s Specifications (no less than annual) – *out of tune radios contribute to Control Channel Saturation*
General radio usage best practices have been identified by many sources, including the National Public Safety Telecommunications Council (NPSTC). For more information, visit:

npstc.org/radioInteropBP.js
JOSE DE ZAYAS
Radio System Administrator
Broward County Office of
Regional Communications and Technology
• Radio Operations User Guide
• Approved Regional Standard Fleetmap and SOPs
  - *with input of Police and Fire Chiefs Associations*
• Annual Training (with tracking)
• Routine Follow-up Exercises
Mobility Updates (affiliations/deaffiliations)

Mobile Updates between 1P-6P on 2/14/2018
3 day comparison of system activity
Fourth Quarter
Calendar Year 2019

Efforts to expedite this timeframe are being evaluated.
Given that any system is susceptible to resource limitations in a mass incident, these best practices will be implemented immediately and throughout the year to improve system performance, and will continue in the new public safety system.

- Dispatcher Announcements Regarding Radio Operations
- Exception Reporting of Specific User Affiliations Contributing to Control Channel Saturation
- Formal Communications Training (radio and dispatch) – starting Summer 2018

Stop gap measures cannot be addressed with any currently available technology.
Radio Best Practices
+
Stop Gap Measures
+
User Training
• Local Government Radio System - 4,500 Fewer Local Government Radios on New System by Q1 2019
  – *School board to determine solution for their radio system needs before new public safety system comes online*

• Regional Standard Fleetmap
• User Training and Awareness
• Backup System and Faster Independent System Controller
• Early Warning Trigger (in development)
• Security (new P25 Authentication prevents duplicate IDs, cloned radios, etc.)
In addition to the Radio System Replacement, the County has acquired, installed or in the process of installing:

- Next Generation CAD
- Fire Station Alerting System
- Viper 911 Phone System Upgrade
- Text to 911 (estimated available Dec 2018)
- Regional Automatic Call Distribution

To date, the capital value of new enhancements total $81.3 million; and operations are now valued at $57.7 million. Total system investment is over $140 million.
MOVING FORWARD: BROWARD’S NEW 911 RADIO SYSTEM

QUESTIONS?