FM1960 Combined Fire Group, Houston, Texas
Champions, Cypress Creek, Klein, Little York, Ponderosa, Spring

TaitNet AS-IP Simulcast solution

Simulcast Forum XXI
Customer Situation

*Six suburban fire/ems agencies*

- Large population
- Large coverage area
- Limited frequency availability
- Not enough tactical frequencies
- Mission Critical paging and voice
- Low Risk, High performance, reliable system
Component Overview

Tait Analog Simulcast over Microwave Network

Hardware Consist of:

- 3 - Tait TB9400 IP bases (one per site)
- 3 - Spectracom GPS Master Oscillators
- 3 - Mikro Tik Cloud Core Routers
- 6 - Carlson Wireless Long Haul 4.9 PS GHz
- 1 – Spare Component of all the above

Single UHF Channel, 3 site Analog Voted Simulcast; Linked by IP microwave ring configured for Open Shortest Path First OSPF
Network Traffic Will determine BW requirements

General Bandwidth Considerations Include:

Topologies:
- Ring IP Network (full connected circle) Which we used
- Ring IP Network Broken
- Star IP Network (T configuration) End to Center to End

Voice Traffic
- Control Packets for channel groups

Maintenance Traffic
- Number of Channel per site

SNMP: Simple Network Management Protocols
- Web interface
- Alarms, number of devices, polling period, number of monitoring parameters per device

Minimum Bandwidth 64K per physical channel
- Packet Loss less than 0.01%
- Latency less than 40ms
- Jitter less than 20ms
Plum Creek Tower / Slave Site
Tait TB9400
(Noble Energy Equipment Rack)

- True Plug and Play
- IT ready: Remote management, monitoring, web interface, SNMP, built-in diagnostics
- Popular and proven system
- Rugged, proven, reliable TB9400
- Central voter, failover built-in
- Firmware upgrade
- Significant reduction in hardware/rackspace
Spectracom SecureSync is required to provide 10MHz, 1PPS, and NTP - Network Time Protocol - signals (for Analog operation) to the TB9400 for the timing and location.

Spectracom SecureSync uses an outside GPS antenna to acquire timing accuracy.
Mikro Tik Cloud Core Router

Specifications:
- 4GB RAM, 1GB Storage
- 10/100/1000 Ethernet Ports

The Spectracom, the Tait TB9400, and the Carlson microwave plug into this router.
TB9400 Software Screen shot of Self Regulating Marshaling

<table>
<thead>
<tr>
<th>Channel Groups</th>
<th>General</th>
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<tbody>
<tr>
<td></td>
<td>Number 1</td>
</tr>
<tr>
<td></td>
<td>Name</td>
</tr>
<tr>
<td></td>
<td>IP address</td>
</tr>
<tr>
<td></td>
<td>Port</td>
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</table>

<table>
<thead>
<tr>
<th>Voting</th>
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<tbody>
<tr>
<td>Voting type</td>
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<tr>
<td>Analog vote hold off control</td>
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<tr>
<td>Analog vote hold off time</td>
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<tr>
<td>Maximum skew</td>
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<tr>
<td>Marshalling</td>
<td>Self-regulating</td>
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<tr>
<td>Self-regulating buffer min</td>
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<tr>
<td>Fixed duration</td>
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<tr>
<td>Tx delay</td>
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<th>Conventional console gateway</th>
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<td>Port</td>
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Fire Chief Comments

“This is a **mission critical** system for us serving six different fire departments covering 500,000+ population in a **170 square mile** area. Failure of this system is not an option. Multiple sites and multiple system redundancies help us achieve that mission.”

“It was a pleasure to implement this system with NW Communications and Tait as our vendors and we look forward to working with them in the future.”

Thank You,
Richard Lieder, CFO EFO
Fire Chief – Cypress Creek Fire
Don Cameron

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