Harris-Tait
Analog Simulcast over IP
(AS-IP)

Featuring the TB-9400 Base Station
TB-9400 Base Station

- FM/P25C/P25T Phase 1 and 2
- Linear Power Amplifier
- LSM in P25 mode
- SNMP Network Management
- DFSI and ISSI/CSSI interfaces to many console choices
- All components within chassis
- 100% duty cycle
- Web based management
- All IP connectivity
- Internal voter and simulcast controller
- Supports VHF, UHF, 700/800 MHz bands
TB-9400 Configurations

1 channel, 100W (front view)

2 channels, 50W

Up to 4 channels, receive only
Built-in Spectrum Analyzer

Cool Tool!!!!
Tait Analog Simulcast over IP (AS-IP)

- Excellent system migration from Analog to P25
- Full re-use of hardware & software licences for voting and simulcast
- Up to 14 sites per channel group
- Native IP based solution
- Small equipment footprint
- Network management and SNMP
- Excellent Paging Platform
Why Simulcast?

• Efficient re-use of frequencies at adjacent sites
• Balanced coverage in both talk out and talk back
• Receiver Voting
• Seamless, Wide area coverage
• Support for Analog, Digital, P25
• No need for users to change channel between sites
Simulcast Tolerances by Technology

• Analog has always been forgiving over the overlap, allowing for mostly omni-directional antennas

• P25 C4FM is half as forgiving over the overlap and limits tower spacing, often requiring directional antennas

• P25 Ph1 LSM and Ph2 Simulcast increases site separation over C4FM Simulcast

• P25 Ph1 LSM is more tolerant than Analog Simulcast
Basic AS-IP Network
Typical AS-IP Network – Hub & Spoke
Typical AS-IP Network – Loop
Case Study – AS-IP Customer in Tennessee

Marshall County, TN
A Look At Their Legacy System

- All Analog
- 3 Sites
- 3 Repeaters, 3 Channels per site
- Users had to manually switch radio channels
- Non-Simulcast, user access managed with CTCSS tones
- Had lots of coverage holes
- No roaming
- No possibility of migration
Marshall County’s Unique Needs

- Maximize coverage with existing sites
- Seamless, Wide-Area Coverage
- Wanted to future-proof their system
- Migration path to P25, Phased approach!
- Low risk, high performance
- Need stability and reliability
- Low Total Cost of Ownership
Ci and Dealer Partnership

• Local Dealer Middle Tennessee 2-Way is the Servicer of Account

• Ci Assisted the Dealer with:
  ✓ Coverage Modelling
  ✓ Antenna Designs
  ✓ Equipment Configuration, Pricing & Ordering
  ✓ Technical Support
A Look at the new AS-IP System

• Analog Simulcast - for now
• 3 Sites of UHF - 1 Channel each
  ✓ MCSO
• 3 Sites of VHF - 2 Channels each
  ✓ Fire/EMS
• IP Backhaul
• New Antenna Configuration
Customer Migration – Marshall County, TN
GPS Disciplined Time and Frequency Synchronization

Spectracom SecureSync

- One at each site
- 10 MHz Frequency Reference
- 1 Pulse per Second
- NTP for Timestamps
IP Backhaul

Cielo Networks IP Backhaul

- SkyLink CG2 Compact Gigabit Ethernet PTP Radios
- 11 GHz
- Licensed for 10 Mb/s
- Indoor/Outdoor Split Package
- COTS Switches
  - Simple, Un-Managed Switches
  - Routers not required in simple network
Implementation – Gotcha’s

- Started with Receive Antenna on top of tower
  - Intent was to maximize RX reception
  - Had to swap the Transmit and Receive so transmit on top due to shadowing
- Emphasis on staging, even on small systems!
- Experienced some early-on audio issues
  - De-Emphasis was set to “Flat” audio response at one of the sites
  - Caused audio to sound like poorly-timed overlap region
Post Implementation Summary

• Overall, as-predicted improvements over what they had
  ✓ Improved coverage countywide in both VHF and UHF
  ✓ Plan to add towers in the future

• Success!!! Customer Satisfied!
  ✓ They can now seamlessly talk from one end of the county to the other!
  ✓ They now have a software upgradeable platform to P25!
  ✓ They now have a migration-friendly, modular platform at a price point they can budget!
Thank You!

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