Standards, Interconnection & Interoperability of Voice and Data Communications

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Standardizing for Voice Interoperability

- **LMR interoperability best served by P25 systems**
  - Voice, low speed data
  - Reduces dependency on a single vendor
  - Could significantly improve basic interoperability
- **ISSI (Inter-RF SubSystems Interface) is key**
  - IP based
  - Interconnects multiple LMR systems from multiple vendors
  - Permits mix of RF Subsystems from different vendors
  - Connects systems operating in different bands
  - Version 1 for trunked systems just released for ballot
    - Multi-system support for OTAR, etc, in future releases
  - Version for conventional systems to be released next
- **ISSI will also serve as basis for console interface**
  - Further aids interoperability by permitting system-independent dispatch. Allows control to be transferred to another site

Some P25 Issues

- **Standards definitions sometimes result in different interpretations/ implementations by vendors**
  - Result: some incompatibility between P25 equipment
  - Need to be tightened up to assure interoperability
  - Conformance testing program being initiated
- **Plethora of options**
  - Relatively small number of Mandatory features
  - Large number of Standard Option features
    - Implementation at manufacturers' discretion
    - Manufacturer specific options are also allowed
- **Users order "P25 System", expect interoperability**
  - May not know what optional features they are getting
  - May expect a (optional) feature to work with another agency; but find that it is absent or configured differently in the other system

ISSI Issues in Large Scale Disasters

- **As P25 systems proliferate, roaming, encryption, management etc will require intersystem connectivity**
  - Roamers come in to help. Get credentialed and configured
  - Single console site might serve a wide area of mixed systems
- **Maintenance of the ISSI links for Interoperability**
  - Failure would isolate systems, break seamless interoperability
  - Could require terrestrial and wireless backup
    - What is the bandwidth required in various scenarios?
  - Could require using VSAT terminals or High Altitude Platforms
    - Will the P25 ISSI work over satcom links?
    - Issue for DOD in combat theater, places like Alaska, today.
- **Interoperability in disasters requires known minimum performance capabilities in existing systems**
  - Excessive customization hinders interoperability

Standardizing for Data Interoperability

- **Wi-Fi (IEEE 802.11) and WiMax (802.16) are strong**
  - Wi-Fi works best in Incident Area Networks
  - WiMax (fixed & mobile versions) for Jurisdictional Area Networks
  - Specialized use of these at 4.9 GHz or 700 MHz more costly
  - COTS products offer most cost effective solutions, interoperable
    - Need to be less fearful of COTS equipments and Bands
  - Provisions for some low speed Wide Area data in P25
- **IP networks help standardize interconnectivity**
  - Only works if standard IP tools/protocols are used
- **Applications Interoperability Is the major problem**
  - CAD, Medical, Sensor, Tracking, Alerting, data are incompatible
  - Justice Dept has worked to interconnect Law enforcement
- **No generally agreed upon common apps/standards**
  - Even VOIP comes in several (incompatible) flavors

Maximizing Interoperability from the Start

- **Start talking to all your neighbors ASAP !!**
  - Independence OK for operability, NOK for interoperability
  - You may both learn of a solution, or about new problems!
  - Try to agree on as many common platforms as possible
  - Try to use common standard networks, bandwidths etc.
- **Define Common Tiers of services across agencies**
  - Higher tiers would have all features of lower tiers plus more
  - Then choose the tier most appropriate for your agency
- **Do not rely just on names of Standards**
  - Ask the same hard questions from all the vendors on precisely what they offer, down to feature lists, configuration
- **Ask for evidence of interoperability**
  - Will this equipment inter-work with that one, on what features?
  - Will my existing “Standards based” equipment require upgrades?

Beyond LMR: Using Ancillary Infrastructure

- **Leverage non LMR systems to improve effectiveness**
  - Mass media, used with care, act as additional eyes and ears to provide situation reports, using own satcom and other equipment
  - Radio broadcasts reach large population using cheap terminals
    - Cheap batteries. Hand-cranked radios minimize power problems
    - Help maintain a sense of connectedness and calm
    - Reduce load on 9-1-1 services by providing common information
  - Paging systems are easily restored and have long life terminals
  - Cellular systems, if they survive, can disseminate broadcast information using cellular alert technology, with lower battery use
- **Use tighter information link than press conferences**
  - Standards, regulatory, operational, issues need to examined
- **High Altitude Platforms could replace towers**
  - Carry Pods with repeaters for common services and LMR

Takeaways

- **LMR and Data standards bring own sets of issues**
  - Careful planning and inquiry required to assure interoperability between standards based systems
  - Intersystem links crucial to roaming and interoperability
  - Defining Tiers of services could help maximize LMR interoperability
  - Broadband data + VOIP, using Satcom links for rapid connectivity
- **Recognize that a disaster needs more than two-way LMR communications to manage successfully**
  - Need recognition of broadcast, cellular, and paging services as partners (even if they fail in many instances)
  - One-way information dissemination can be easier to set-up & serve the needs of much of the population
  - Develop standards, procedures to tie-in to emergency response
- **Leadership needed to resolve these issues**