Special Committee on Wireless Communications Technologies

Chair – Bill Brown, Virginia
Vice – David Chase, New Hampshire
AASHTO – Bill Brownlow

August 24, 2009
Who What Why

• Represent AASHTO and member organizations at the FCC and national level
• Actively study current and developing technologies for applicability to highway maintenance operations, transportation security and ITS programs
• Depository of technical information, solutions and advice on transportation-related wireless systems and equipment
National Representation
Public Safety Broadband Network
“First Responders include fire, police and emergency medical personnel. It is important that they have access to reliable, interoperable communications to assist those in need during emergencies.”
National Representation
Public Safety Broadband Network

**AASHTO Resolution**

- **WHEREAS**, for those state DOTs … no direct communication will be allowed on these frequencies with police, fire, or EMS units … Thus, the State Departments of Transportation may be severely limited in their ability to respond to a disaster;
National Representation
Public Safety Broadband Network

**AASHTO Resolution**

- **RESOLVED,** ... the AASHTO Board of Directors urgently requests the FCC revise their interpretation ... and to classify State Departments of Transportation as protectors of life, health or property as per Section 337 (f)(1)(A); and further be it

- **RESOLVED,** ... the ability to authorize critical infrastructure industry users access to the public safety broadband network on a case-by-case basis.
National Representation
Public Safety Broadband Network

AASHTO Resolution

- Drafted and submitted by SCOWCOT
- Endorsed by Commissioner Ekern
- Approved by AASHTO Board of Directors
The AASHTO is right to question the FCC’s overly restrictive definition of what a first responder really is, and I hope that its action, along with the comments of others, will help the FCC recognize its error.

It would be odd, to say the least, if they were not permitted to use this network during times of emergencies. And during evacuations of areas threatened by fires and hurricanes, the DOT’s network and personnel play an integral role in managing the flow of residents out of the area and emergency responders into the area.

Snow plows are first responders when emergency vehicles cannot get through and bulldozers are first responders when there is a fire.
Transportation Plays Large Role in Emergency Response

Public safety is in the midst of a paradigm shift. The role that emergency responders play has escalated rapidly since Sept. 11. Hurricanes, wildfires, snowstorms and severe flooding have further tested our traditional definition of emergency response in recent years, causing Americans to re-examine how the country prepares and responds to emergencies. The role the American Association of State Highway and Transportation Officials (AASHTO) and its members play in protecting citizens is becoming better understood.

AASHTO and its members support the National Incident Management System, and the Transportation Cooperative Research Board, the association works with many public-transportation providers to explain narrowbanding and how it affects daily operations. This effort is expected to help bus and rail providers integrate into emergency response as they provide transportation to vulnerable populations.

AASHTO recently filed a petition with the FCC to allow the removal of an emissions designator from a license without proof of frequency coordination. AASHTO believes many agencies are delaying the addition of narrowband emission designation because of the costs for changing hundreds of licenses, not once, but twice. A licensee files through a coordinator to add narrowband emission, and then once...

AASHTO
The Voice of Transportation
US ARMY / JOINT STAFF ORG

COMMANDER

FIELD COMMANDERS

EXECUTIVE OFFICER

S1 HUMAN RESOURCES

S2 INTELLIGENCE SECURITY

S3 OPERATIONS TRAINING

S4 SUPPLY LOGISTICS MAINTENANCE

SIGNAL (COMM - ELECTRONICS)

Primary staff!
Why Comm on Primary Staffs in Department of Defense

• Communication is inseparable from effective Command and Control (C2), more commonly referred to as C3
• Ensures involvement in
  ▪ Daily Operational Requirements
  ▪ Contingency Plans
  ▪ Training
  ▪ Maintenance
• One coordination point for technical advise and review for agency wide projects
• DOT Wireless professionals often obscured
  ▪ reduced visibility or exposure
States’ Wireless Organization
Various Job Titles of Wireless Managers

- Communications 17
- Electrical 1
- Info Technology 7
- Equipment Engineer 2
- Telecom Engineer 7
- Radio Communications 7
- ITS Engineer 2
- Wireless Eng/Systems 2
Professional Development

• Wireless communications is a core DOT resource, function and skill.
• Provide for in-house capability
• Continuing education accordingly
  ▪ Attend / Participate AASHTO Wireless Events
  ▪ Attend Annual IWCE
History of the Universe
A Tribute to the Stupidity of Mankind

14 Billion Years

Time

Knowledge

AASHTO
The Voice of Transportation
• 1876 – Western Union rejects offer to buy Bell’s telephone patent (“toy… of no use”)
• 1877 – Bell, Hubbard form Bell Telephone
• 1882 – Bell buys controlling interest of Western Union
A History of the Universe
A Tribute to the Stupidity of Mankind

1945 – Dick Tracy breaks out the wrist radio
A History of the Universe
A Tribute to the Stupidity of Mankind

- 1945 – Dick Tracy breaks out the wrist radio
- 1999 – “Buy your own chain of public pay telephones!”
- 2002 – Income from pay telephones drops 95%
Leveraging Technologies
Ethernet Backhaul over Microwave

- Create extension of WAN / LAN
  - Critical infrastructure
  - Along interstate
- High Throughput
  - 1 to 1000 Mbps
  - Rapid installation compared to fiber/leased
  - Quick ROI
- Security and Traffic Cams
- Control of TIS and overhead signs
- Real time data from RWS, Road Sensors
- Pre-position Agency Wi-Fi Hotspot for Jump TOCs
Microwave Ethernet Backhaul
Real World Example – New Kent, I-64

• Internet existed at West Bound Travel Center
• State IT Agency unable to provide solution for internet at East Bound side
  ▪ 7 Month wait, $50,000 cheapest solution
• VDOT Radio section engineered, procured, installed solution
  ▪ 3 weeks
  ▪ < $5,000
Microwave Ethernet Backhaul
New Kent

36 Mbps Capacity Ethernet
T1 Extension 1.4 Mbps
Internet for Tourism Office EB
Security Cameras Video
Microwave Ethernet Backhaul
Real World Example
Traveler Information System Radio

• TOC Techs complaint - Slow
  ▪ 45 minutes to upload 6 MB .mp3 audio file
  ▪ Dial-up often disconnects, 90 minutes not unusual
  ▪ Message OBE by time of completion

• Radio Office Microwave Demo
  ▪ Microwave Broadband :55 seconds
  ▪ 900 MHz Spread Spectrum 2:00
Wireless Backhaul Pipe
Capacity and Planning Factors

Reserve Capacity
RWIS, Counters, Laptop, Signal Fade

Planned Usage for video
( #Cameras x Bit Rate )

6-8 Mbps

6-10 Mbps

15 -18 Mbps Upstream

Link Total Throughput = 36 Mbps, 18 Mbps Up and Down
Wireless Backhaul Pipe Capacity and Planning Factors

Now up to 100 Mbps

< $4,000 per link

2 X T3 Equivalent

Link Total Throughput = 100 Mbps, 50 Mbps Up and Down
Potential Interstate Use of Microwave Broadband Backhaul

18 - 50 MBPS

Backbone Node
Collocated IP PTZ Camera

0.5 – 8 + Miles per Hop

1 MBPS
900 Mhz Spurs

Spur Connects Cameras, Data Devices

0.5 – 8 + Miles per Hop

Traffic Sensors
RWIS
Fog
IP PTZ Cameras
Overhead Signs
TIS AM Station

ZOMBIES AHEAD
Microwave Ethernet Backhaul – One T1 Replacement

Cost Comparison, Microwave Backhaul vs Leased T1

ROI 2 Months!!

~$5000 per year per line!

AASHTO
The Voice of Transportation
Impending Explosion in Communications Technology – 4G

4G Mobile Data, Cable Modem Speeds via USB stick, handset (coming)

Wi-Max – ClearWire, Sprint 2009-2010
Long Term Evolution (LTE) – Verizon 2012
Impending Explosion in Communications Technology – Dual Mode

Satellite From Handset!
Terre Star Satellite Launched July 2009
First tests successful
Impending Explosion in Communications Technology – Dual Mode

- Dual Mode
- Default Cellular
- Auto Switch to Satellite
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