# DTN Bundle Protocol Use Cases

Fred L. Templin
fred.l.templin@boeing.com

# Space Systems Communications

International Space Station (ISS) Tracking and Data Relay Satellite (TDRS) Availability, Bandwidth and Latency

Deep Space Communications (One-Way Light Time (OWLT) from Earth to Mars ~4min minimum)

Space System Support for Isolated Ground Systems (Data Exchanges Only Possible During Satellite Over-Flights)

Need:

- BP Compressed format for resource-constrained devices
- BP End-to-end integrity assurance
- Streamlined Security
- Security Key Management

# Unmanned Air Systems (UAS)

Unmanned Air Systems (UAS) in the National Air Space (NAS)

FAA: UAS integrated into the NAS by 2015

RF Communications Occasionally Subject to Disruption

Operation in Remote Regions can Result in Extended Outages

Internet Protocols Alone Insufficient to Assure Safety of Flight

UAS Will Operate in the Same Airspace as Commercial Aviation

Need:

- BP and SBSP Improvements
- Security Key Management
- Dynamic Routing
- Neighbor / Contact Discovery

# Disaster Response and Humanitarian Aid

Communications Infrastructure Frequently Impaired or Decimated

Response Teams Use Portable and/or Vehicular radio systems - "Reachback" via SATCOM; Terrestrial Links-of-Opportunity

Long Delays when Connected; Extended Periods of Disruption

Loss due to attrition, battery lifetime, sensor network duty cycles, etc.

Ad-hoc Approaches Often Result in Communication Failures

Need:

- BP and SBSP Improvements
- Security Key Management
- Network Management
- Neighbor / Contact Discovery

# Unmanned Underwater Vehicles (UUV)

UUV Networking Still in Exploratory Phase

Speed of Sound Underwater is only 1.5 km/sec; Data Rates are Low

Long-endurance UUV Operations (days/weeks/months)

Delay Tolerant Multi-Hopping Between Mobile UUVs

Message relaying based on scheduled/unplanned windows of opportunity

Secure Store, Carry and Forward of Data Objects Larger than Packets

Need:

- BP Compressed format for resource-constrained devices
- Streamlined Security
- Neighbor / Contact Discovery

# Civil Aviation

Aeronautical Telecommunications Network (ATN) (low delay)

Air Traffic Control (ATC), Airline Operations Control (AOC) track aircraft over ATN in all phases of flight

System-Wide Information Management – significant delays possible

Aviation data links can experience disruption; some may not be available during all phases of flight

Periods of complete data link outages possible

Need:

- BP End-to-end integrity assurance
- Streamlined Security
- Security Key Management

# Summary

- Many use cases, with more on the way
- Of interest to many industry sectors
- Bundle Protocol and security as enablers
- DTNWG provides framework for moving the technology forward