SCHC Convergence Profile

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SCHC Convergence Profile

• Update from previous interim presentation
  – Individual Submission
  – Added motivation and use cases
  – Added comparison between SCHC over LoRaWAN and SCHC over Sigfox Uplink ACK-on-Error mode
Motivation

• IoT applications are tied up to the selected LPWAN technology.
• The LPWAN constraints influence the design of the IoT application itself.
• Migrating to other LPWANs implies redesigning the IoT application.
• The LPWAN, as L2, should be transparent as it is in the IP domain.
Motivation

• Current SCHC implementation
  – Single SCHC C/D sublayer
  – Multiple SCHC F/R sublayer one per LPWAN (different but similar fragmentation modes)

• To reduce code complexity and maintenance, a single convergent SCHC F/R sublayer.
Multiple SCHC Implementations

![Diagram of Multiple SCHC Implementations](attachment:diagram.png)
Single SCHC Implementation

End devices (devices)  Radio Gateways (RGW)  Network Server  SCHC C/D and F/R Server

Network Gateway (NB-IoT)  SCHC C/D
Network Core (SigFox)  SCHC over All
Network Server (LoRaWAN)  Application
Use cases

• Multi-radio devices: Devices implementing more than one LPWAN radio.
• Multi-network applications: Applications deployed over more than one LPWAN.
• Generic SCHC F/R Profile for implementation of SCHC to test over a new technology. SCHC out-of-the-box F/R modes.
Use Cases

• Network Redundancy:
  – Devices using another LPWAN as backup.
  – Devices sending the same or different SCHC Fragment in different networks to increase probability of success.
  – Increased device duty-cycle as more networks are available.
  – Device sending SCHC Fragments over different LPWANs to check available coverage.
Single SCHC ID

• To simplify the access to RuleIDs and to converge the different deviceIDs provided by the networks involved.
• Rules are defined per device.
• Device ID translation table maps the network device ID to single SCHC ID to find device rules.
Uplink fragmentation

- Comparison between SCHC over LoRaWAN and SCHC over Sigfox (option 2)
- Similarities:
  - 2-byte SCHC Fragmentation Header size.
  - 10-byte tile size.
  - 2-byte Rule ID size.
  - No DTag
- Differences:
  - WINDOW_SIZE (tiles per window).
  - M size (maximum number of windows).
  - N size (tiles per window).
  - Different RCS size and algorithm.
SCHC Convergence Profile

• Uplink ACK-on-Error mode
  – Rule ID size is: 8 bits
  – DTag size (T) is: 0 bits
  – Window index (W) size (M): 3 bits
  – FCN size (N): 5 bits.
  – MAX_ACK_REQUESTS: 5
  – WINDOW_SIZE: 31

  – Regular tile size: 10 bytes
  – All-1 tile size: 1 to 10 bytes
  – Retransmission Timer: Application-dependent.
  – Inactivity Timer: Application-dependent.
  – RCS size: 32 bits
New Open Source Project

• SCHCduino
  – Implement SCHC for Arduino.
  – Single code base for C/D and F/R using SCHC convergence Profile.
  – Simplify application migration between LPWANs for multi-network application.
  – Allow SCHC Fragments to be sent in different LPWAN for multi-radio devices.
  – Device code, not server code (OpenSCHC as server?)
Questions and Comments?
Thank you!