LPWAN Architecture and general newcomer presentation

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Low-Power Wide-Area Networks
25 mW transmission power

Low-Power Wide-Area Networks

20 years on simple battery
Low-Power **Wide-Area** Networks

15-50 km rural outdoor

2-3 km urban indoor
Low-Power Wide-Area Networks

- No scheduling
- Star topology
- ALOHA
- Device-initiated com
- Huge densities
- Asymmetric links
- Low throughput
Low-Power Wide-Area Networks

License free
In licensed spectrum

Duty cycling
Collisions
Acknowledgements

Data-over-NAS
Guard-bands
In-band
Low-Power Wide-Area Networks

License free

25 mW transmission power

In licensed spectrum

15-50 km rural outdoor

Duty cycling

2-3 km urban indoor

Guard-bands

100 bps

No scheduling

12 byte payload

Star topology

(50 kbps max)

Data-over-NAS

Asymmetric links

Device-initiated com

Huge densities

Low throughput

140 messages

ALOHA

12 byte payload (typically 50 bytes)

4 messages

uplink

downlink

x 1%

LPWAN@IETF110
RFC 8376 : LPWAN Architecture
<table>
<thead>
<tr>
<th>Function/Technology</th>
<th>LoRaWAN</th>
<th>NB-IoT</th>
<th>Sigfox</th>
<th>Wi-SUN</th>
<th>IETF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor, Actuator, device, object</td>
<td>End Device</td>
<td>User Equipment</td>
<td>End Point</td>
<td>Leaf Node</td>
<td>Device (DEV)</td>
</tr>
<tr>
<td>Transceiver Antenna</td>
<td>Gateway</td>
<td>Evolved Node B</td>
<td>Base Station</td>
<td>Router Node</td>
<td>Radio Gateway</td>
</tr>
<tr>
<td>Server</td>
<td>Network Server</td>
<td>PDN GW/ SCEF*</td>
<td>Service Center</td>
<td>Border Router</td>
<td>Network Gateway (NGW)</td>
</tr>
<tr>
<td>Security Server</td>
<td>Join Server</td>
<td>Home Subscriber Server</td>
<td>Registration Authority</td>
<td>Authent. Server</td>
<td>LPWAN-AAA Server</td>
</tr>
<tr>
<td>Application Server</td>
<td>Application Server</td>
<td>Application</td>
<td>Network Application</td>
<td>Application (App)</td>
<td></td>
</tr>
</tbody>
</table>
SCHC Architecture

• Provide the reference architecture
  – Modes:
    • SCHC Device/SCHC Gateway
    • SCHC Peers

• RFC 8724 and Rules
  – Introduces Yang data model
  – Discusses rule creation and update
  – Discusses rule installation and discovery
SCHC Architecture

Device
Application

End-Device

Network
Application

Application
Server
SCHC Architecture

Radio Gateways (RGW)
SCHC Architecture

Network Gateway (NGW)
SCHC Architecture

SCHC Device

RGW

SCHC Gateway

NGW

IP

AAA
Perf
Mgmt

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SCHC Architecture

CORECNN

SCHC Device

SCHC Gateway

Rule Manager

Rules

SCHC CD-FR

IP

AAA

Perf

Mgmt

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SCHC Architecture

SCHC Device

SCHC Gateway

Rule Manager
Rules
SCHC CD-FR

IP/UDP/CoAP

IP

AAA
Perf
Mgmt

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SCHC Architecture

- Rule Manager
- Rules
- SCHC CD-FR

SCHC Device

- Rule Manager
- Rules
- SCHC CD-FR

SCHC Gateway

- IP/UDP/CoAP

CORECONF
SCHC Architecture
Example of Network-level SCHC

Applicatio

IP Stack

Rule Manager

Rules

SCHC CD-FR

SCHC Peer / SCHC Device

Compressed Packets

Rule Manager

Rules

SCHC CD-FR

SCHC Peer / SCHC Gateway

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Example of Network-level SCHC

IP Stack

Rule Manager

Rules

SCHC CD-FR

SCHC Peer / SCHC Device

CORECONF/OSCORE

CRUD

Compressed Packets

Rule Manager

Rules

SCHC CD-FR

SCHC Peer / SCHC Gateway

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Example of Network-level SCHC

- IP Stack
  - Rule Manager
    - Rules
      - SCHC CD-FR
  - SCHC Peer / SCHC Device
- Application
  - CRUD
  - CORECONF/OSCORE

Compressed Packets

SCHC Peer / SCHC Gateway