SCHC for ZE (Zero Energy) Devices

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- Cellular Based ZE-Devices
  - Devices and topologies
  - User plane characteristics
- Delay friendly optimized transmissions
- SCHC Context configuration
- Payload compression

Device Types

Device A
- No energy storage
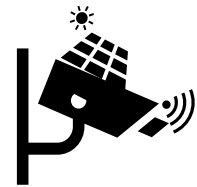- no independent signal generation/amplification, i.e. backscattering transmission.

Device B
- Has energy storage,
- No independent signal generation, i.e. backscattering transmission.
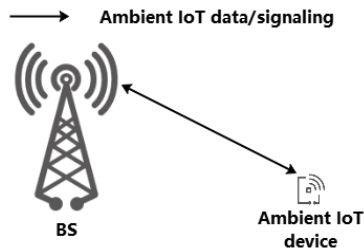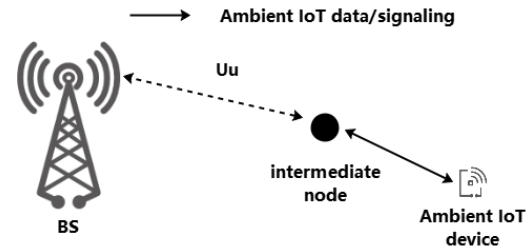- Use of stored energy can include amplification for reflected signals.

Device C
- Has energy storage,
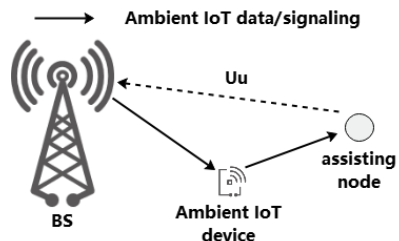- has independent signal generation, i.e., active RF components for transmission.

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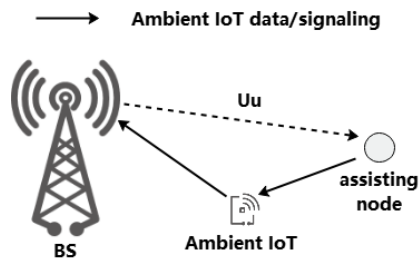
3GPP Considered Topologies

Topology 1 — BS ←→ Ambient IoT device; Ambient IoT data/signaling

Topology 2 — BS ←→ (Uu) intermediate node ←→ Ambient IoT device; Ambient IoT data/signaling

Topology 3 — BS ←→ (Uu) assisting node ←→ Ambient IoT device; BS ←→ Ambient IoT device ←→ (Uu) assisting node; Ambient IoT data/signaling

Topology 4 — UE ←→ Ambient IoT device; Ambient IoT data/signaling

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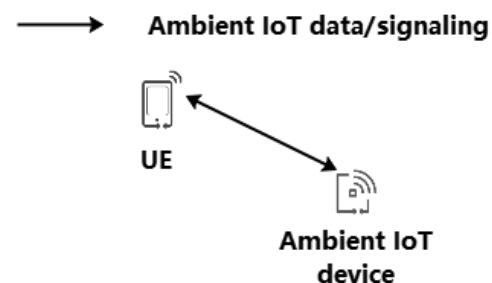
User plane characteristics

- Simplified operation to save energy
  - Longer delays for transmissions/receptions
  - Lower reliability
- Overhead reduction
  - Segmentation (fragmentation)
  - Headers and potentially payload compression
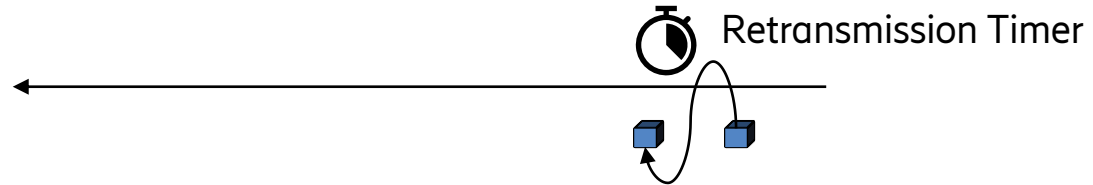 - Reliability support
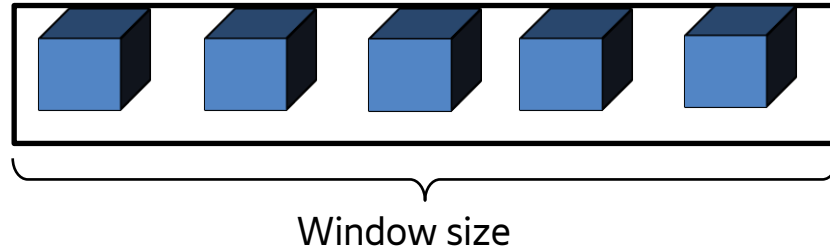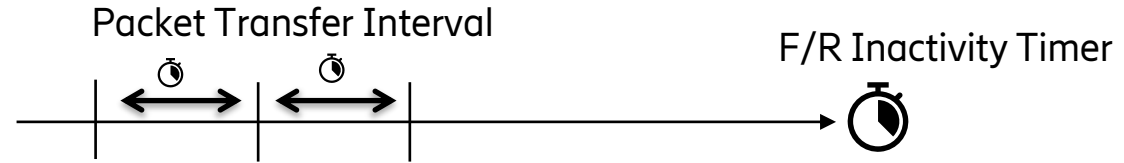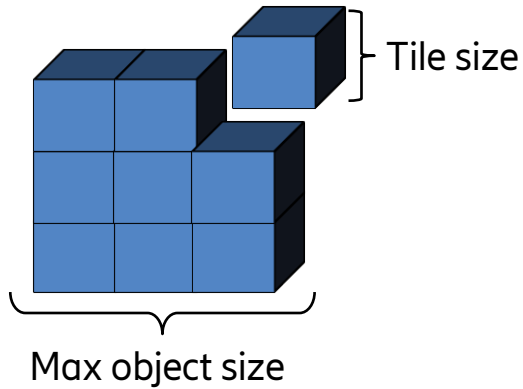 - Padding reduction/elimination

SCHC

Zero Energy UEs would transmit quite infrequently, unpredictable and small payload

Payload

transmission

Operator platform

APIs

IP tunneling

Applications & application servers
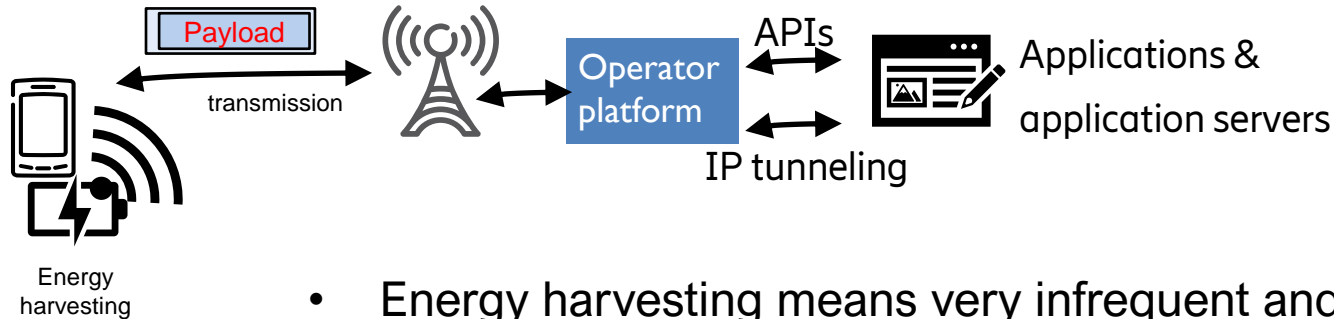
Energy harvesting

- Energy harvesting means very infrequent and unpredictable transmission of little data
- The transmission should maximize likelihood of decoding and higher layer protocols should support delay tolerant and low overhead capabilities

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SCHC Delay tolerant parameters

Tile size

Max object size

Packet Transfer Interval

F/R Inactivity Timer

Window size

Retransmission Timer

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Context configuration

Out-of-band configuration

Predetermined profiles factory set

Issue: Notify profile to the network entities

In-band configured by radio control protocol or higher layer protocols

Configuration according to traffic and site characteristics

Issue: Size of context and efficiency of format

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