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Agenda Item: 10.1.1

RP-180374

Motivation for New WID:
L2 UE-to-Network Relaying for IoT Devices

Contents

- Background in 3GPP
- Justification of SI/WI
- Objectives of SI/WI

Background in 3GPP

- **FeD2D study item completed last quarter**

- **Achieved good results in studying a Layer 2 based UE-to-network relay architecture**
  - The studied architecture allows the network to manage the remote device as a full participant in the 3GPP ecosystem (“identify, address, and reach”)
  - Enhancements to the sidelink are investigated with a focus on enhanced reliability, and suitability for unicast communication

- **IoT use cases were considered and the studied enhancements can be applied to IoT devices**
  - Many IoT features (CIoT optimisations, attachment without PDN, non-IP data) are transparent for a L2 relaying architecture
  - PSM works for the remote UE (not the relay UE)
  - Support of eDRX has some impact for the relay UE, to listen during the remote UE’s PTW

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Justification of SI/WI

- The burgeoning population of IoT devices stand to benefit from relaying
  - In real IoT deployments, a nontrivial fraction of devices experience deep coverage holes
  - Need to maintain network connectivity for such devices, while conserving battery power
  - Should offer services in a manner comparable to direct communication
  - Data security should be guaranteed end to end between device and network, as it is today between a UE and the network
  - Corresponding control and signalling procedures would be needed
  - CIoT optimisations need to be supported
- The existing support for L3/IP relaying by PC5 does not meet the above criteria
  - Remote device appears to the eNB as a bearer of the relay device, without its own separate identity
  - Security cannot be assured between the network and the remote device (the relay UE has visibility into the remote UE's data)
  - Cannot easily support CIoT optimisations
- Thus there is a need to specify a layer 2 based architecture that addresses these deficiencies, as studied in the FeD2D study item

Justification of SI/WI

- **To support the unicast communication for relay, sidelink requires some enhancements**
  - **As studied under FeD2D**
  - **Further efficiency enhancements including DRX, link adaptation**
  - **Efficiency for unicast requires power control instead of constant power broadcast transmission**
  - **Support for bandwidth limited remote UEs, in keeping with the IoT objective of the WI**
  - **RAN4 needs to specify core and performance requirements**

Objectives of SI/WI

- **The detailed objectives of the work item are to specify support for the following functionalities:**
  - **Specify a layer 2 based UE-to-network relaying architecture following SA2 assumptions, including methods for E-UTRAN to identify, address, and reach an evolved Remote UE (i.e. eRemote UE) via an evolved ProSe UE-to-Network Relay UE (i.e. eRelay UE).**
    - Protocol stacks for relaying, including adaptation layer
    - Signalling and procedures for the needed functionalities (security, connection management, access control, idle mode operation including DRX on sidelink)
  - **Specify LTE sidelink enhancements with efficient sidelink operation and low complexity/cost & low energy eRelay/eRemote functionality suitable for eMTC and NB-IoT UEs:**
    - Synchronisation enhancements including support of SLSS/PBCH format for 1 PRB bandwidth
    - Discovery enhancements including support of 1 PRB bandwidth
    - Unicast communication including enhancements for link adaptation, power control, and resource allocation
    - Support of resource pool suitable for remote UEs with bandwidth limitation to 6 PRBs or 1 PRB
    - RAN4 core and performance requirements

Thank you !