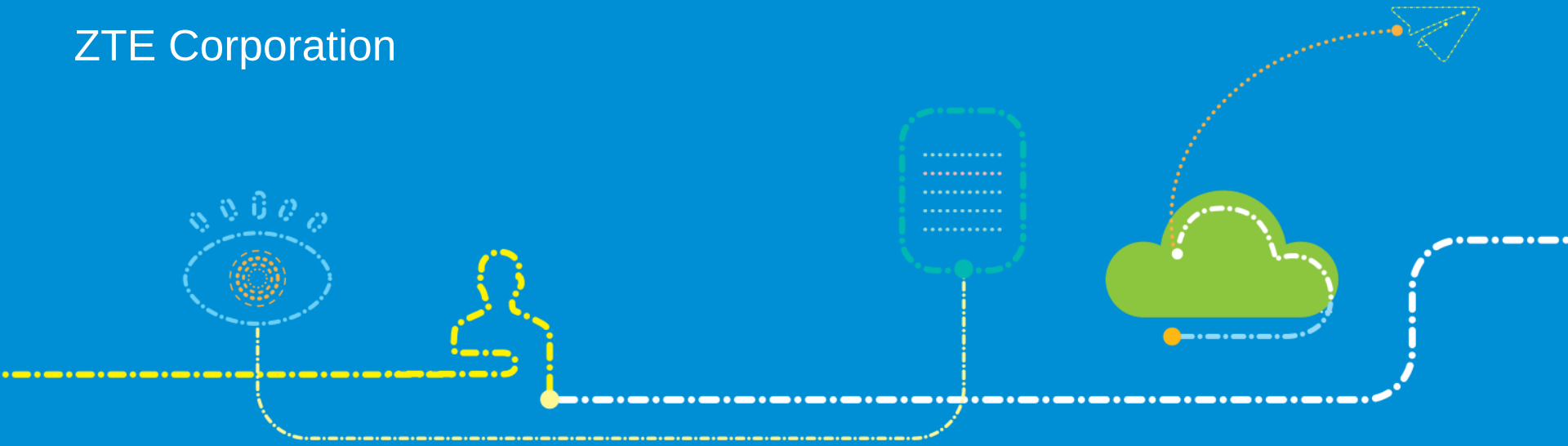
3GPP TSG-SA WG1 eMeeting #97-e
E-meeting, 14th – 24th February 2022

S1-220024

Discussion: Mesh based Local Communication Service

ZTE Corporation



Motivations

In some vertical industry scenarios, e.g. smart mine scenario, the production environment monitoring and remote control are typical working tasks. Sensors, cameras, consoles are deployed and interact with each other within a local area.

-- Multiple consoles on the ground need to directly control different mechanical equipments e.g. the hydraulic support, tunnel-boring machine, in the mine tunnel locally which requires **real-time**, **high reliability**, and **deterministic** delivery of information data between consoles and equipments within the local area

-- The underground mine tunnel is different with traditional area coverage. It is long and narrow, which can up to 100 kilometers long and ten meters deep. Supporting this kind of **extended transmission range** is another new requirement.

-- Considering the extreme working condition, **communication robustness** should be guaranteed when link failure or system fault happens.

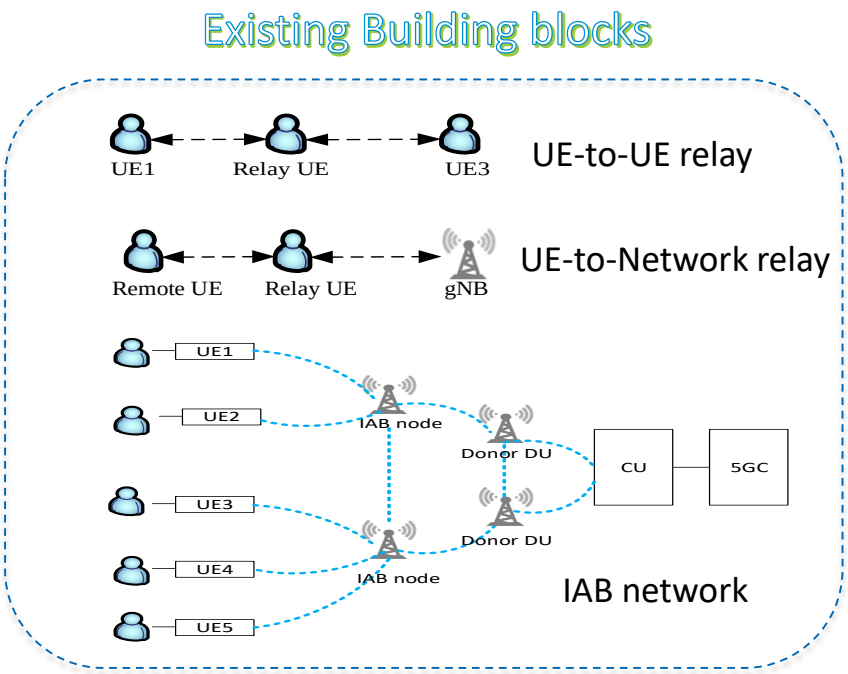
State of Art

- Current 5G network support following buidling blocks:
  - single hop UE-to-network relay,
  - multi-hop IAB,
  - The single hop UE-to-UE relay and multi-path single hop UE-to-Network relay will be specified in Rel-18.

- The single hop UE-to-UE relay and UE-to-Network can extend the direct communication range to some extent. However, the UE act as relay may move from time to time and is not always available. It is hard to ensure the high reliability and deterministic delivery of pacekt.

- Multi-hop IAB may extend the transmission in reliable way. However, it is hard to ensure the latency since the traffic need to pass through a lot of intermediate IAB node and NGC.

- The benefit of multi-path multi-hop relay has not been fully explored.

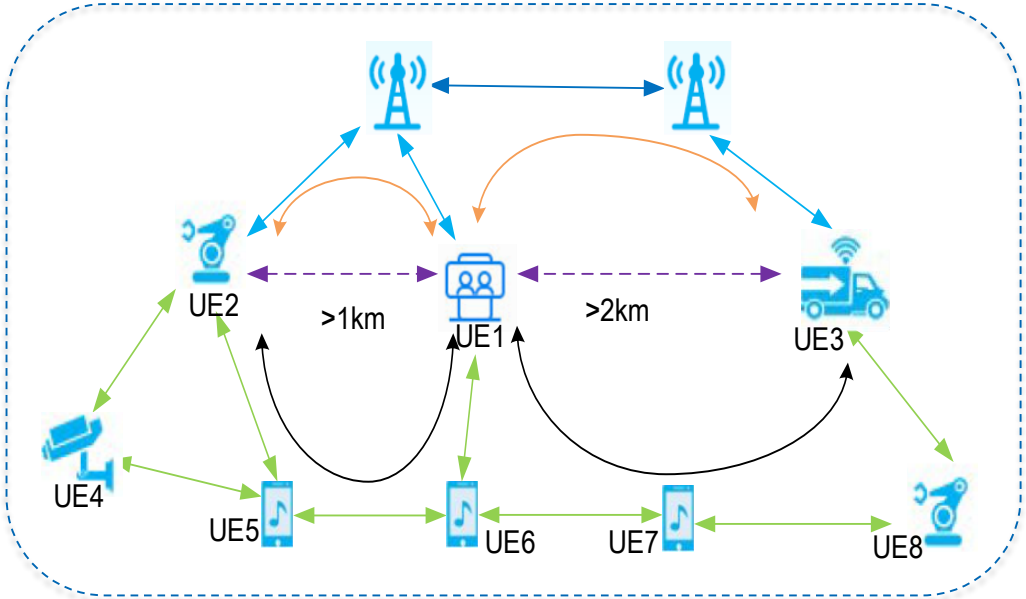


Mesh based Local Communication Service

Mesh based Local Communication Service: *combine advantages of direct wireless communication and indirect network connection based on* ***5G RAN assisted multi-hop multi-path mesh network****.*

Benefits

- ✓ Extended transmission range + low latency
  - hybrid multi-hop Uu and PC5 forwarding
  - Data traffic not traverse 5GC and even CU
- ✓ High reliability
  - Multiple available paths and path switch
- ✓ Enhanced privacy and security
  - Local forwarding restricted to a set of UEs
- ✓ Low deployment cost



Objectives

The objectives of this study item are:

- Study use cases to enhanced 5G system support of mesh based local communication service, including：
  - ✓ UE to UE URLLC communication in local area with long distance
  - ✓ Configuration and management Mesh based local communication service
  - ✓ management specific UE groups which are permitted to use the Mesh service
  - ✓ data path failure monitoring and switch over other path
- Investigate potential new requirements, including:
  - ✓ Configuration and management 5G RAN node to support Mesh based local communication service;
  - ✓ UE group management related
  - ✓ Discovery Mesh based local communication service and selecting available mesh path
  - ✓ Mesh data path switch over
  - ✓ QoS related
  - ✓ Charging and security
  - ✓ KPI related
- Gap analysis between the identified requirements and existing 5GS requirements in 3GPP specs TS 22.261/22.104.