中国移动
China Mobile

3GPP TSG RAN Rel-18 workshop
Electronic Meeting, June 28 - July 2, 2021

RWS-210346

Motivation of study for real-time multiple-UE backup

Agenda Item: 4.2
Source: CMCC

SCENARIOS

- One important objective of 5G is to enable connected industries, where the scenarios are
  - Motion control
  - Control-to-control communication for industrial controller
  - High data rate video for monitoring/ diagnostics

- This scenarios prevalently exist in
  - Factory automation
  - Transport industry
  - Electrical power distribution automotive

PLC

Freight Forwarding

AGV

MOTIVATIONS

- To ensure the high reliability of data delivery, URLLC was introduced in Release 15, NR URLLC is further enhanced in Release 16 and Release 17 within the Industrial IoT/URLLC work items

  - RAN or the UE always transmits duplication data through radio links to the target side simultaneously or within the delay-tolerant time range; However, the issues are as follows
    - Duplication transmission is not resource-efficient in air interface for network capability
    - It face the challenge of failing to meet the high reliability depends on the successful reception just relying on only one terminal in real scenarios

The above use cases therefore can motivate the introduction of an real-time multiple-UE backup mechanism

MOTIVATIONS

- Therefore, actually, more than one terminal is deployed and utilized to receive repetitive content to ensure the reliability as backup
  - This results in high cost of existing backup mechanism for high reliability
    - e.g. battery consumption, radio resource, transport resource, processing resource and redundant signalling/data overhead

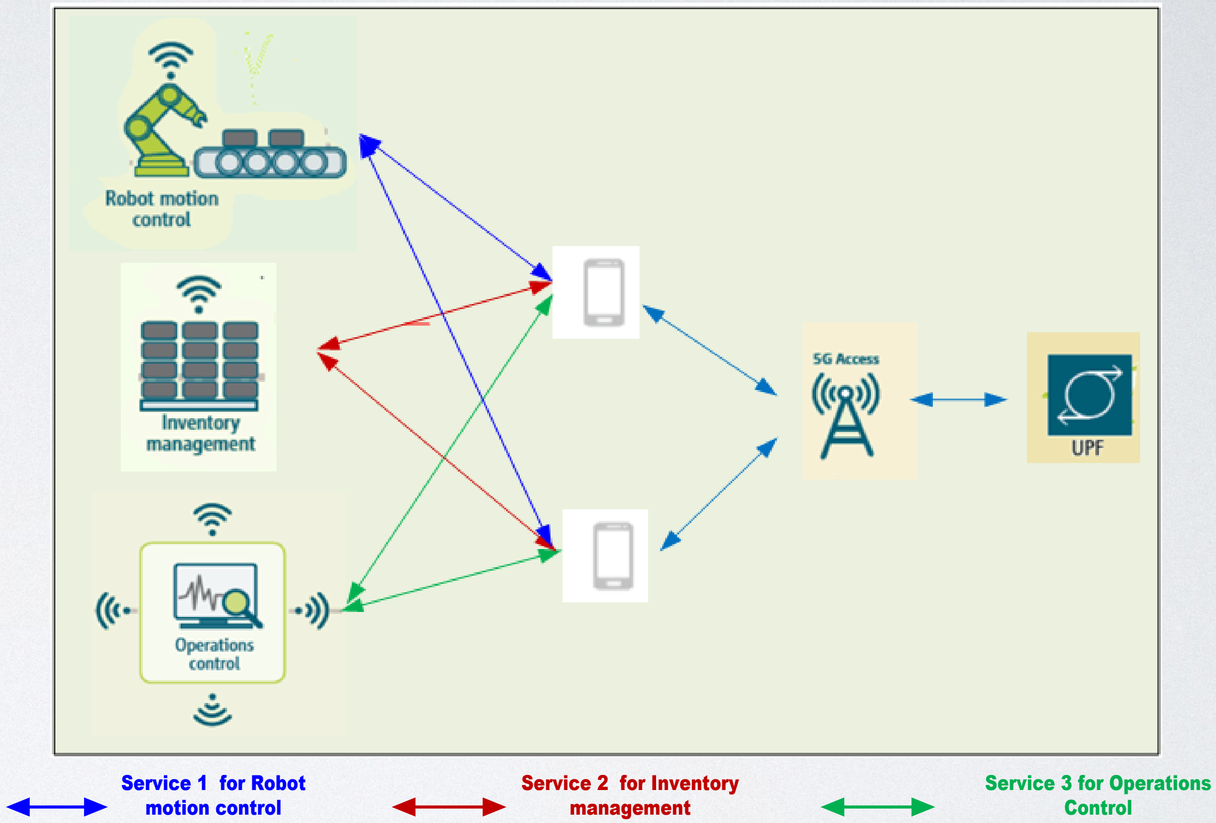

Fig.1 Existing multiple-UE backup approach

MODELS OF REAL-TIME MULTIPLE_UE BACKUP

- For example, terminal 1 and terminal 2 are deployed as real-time backup to each other
  - The UEs can determine whether to take over or start/activate the data/signalling transmitted/received by associated UE for backup
    - Depending on the associated terminal's state
      - i.e. whether the data/signalling can be still successfully received by the associated terminal or not
  - Under normal circumstances, terminal 1 and terminal 2 are responsible for different services respectively
  - If the data/signalling can not be successfully received by the terminal 1, then the subsequent associated terminal 2's action is that the terminal2 is to take over or start/activate the service(s) of the terminal1 declaring in abnormal state
  - In this case, how to ensure the minimal UP interruption and rapid completion of data forwarding between terminals and reduce the transmission overhead will become an issue to be addressed

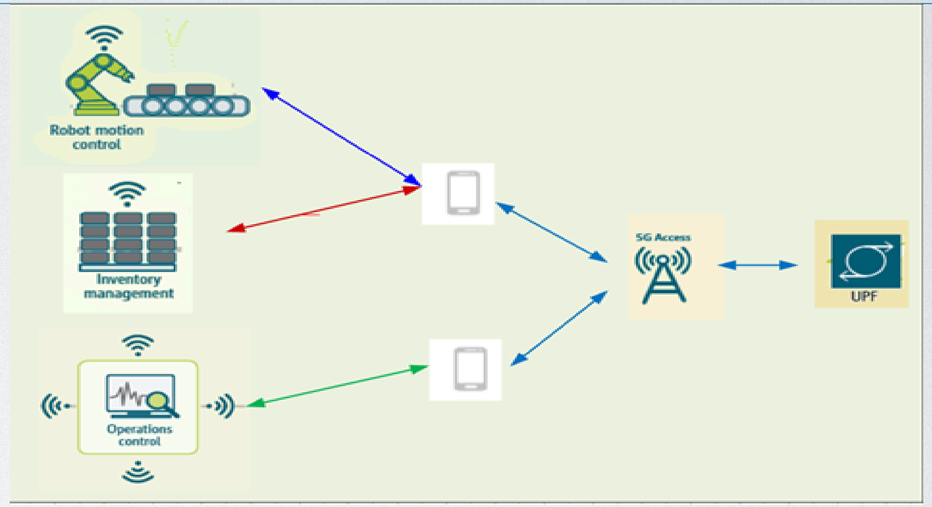

Fig. 2 Real time multiple-UE backup in normal case

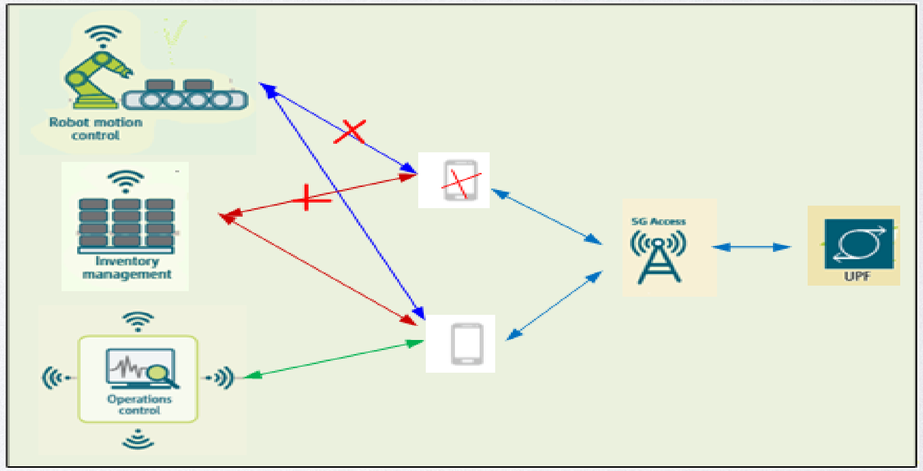

Fig. 3 Real time multiple-UE backup in abnormal case

SI OBJECTIVES

- The objective of this Study Item is to investigation the mechanism of real-time multiple-UE backup and identify its standardization impact
  - Study the use cases and benefits of real-time multiple-UE backup [RAN2, RAN3]
  - Study necessary procedures and/or information to support for real-time multiple-UE backup of data/signalling delivery and reception (e.g. how a given UE to determine whether to take over or start the data/signalling transmitted/received by associated UE for backup) without data disorder or data duplication [RAN1,RAN2, RAN3]
  - Identify required specification changes on the group scheduling options to allow multiple UEs to receive signalling/data in Multicast mode [RAN1, RAN2]
  - Study the support for basic mobility with service continuity [RAN2, RAN3]
  - Identify required specification changes on the RAN that the necessary coordination function (e.g., heartbeat packet between the involved terminals, if any) amongst the associated UEs for backup, considering the results of the NR Sidelink [RAN1,RAN2]

Thank you!