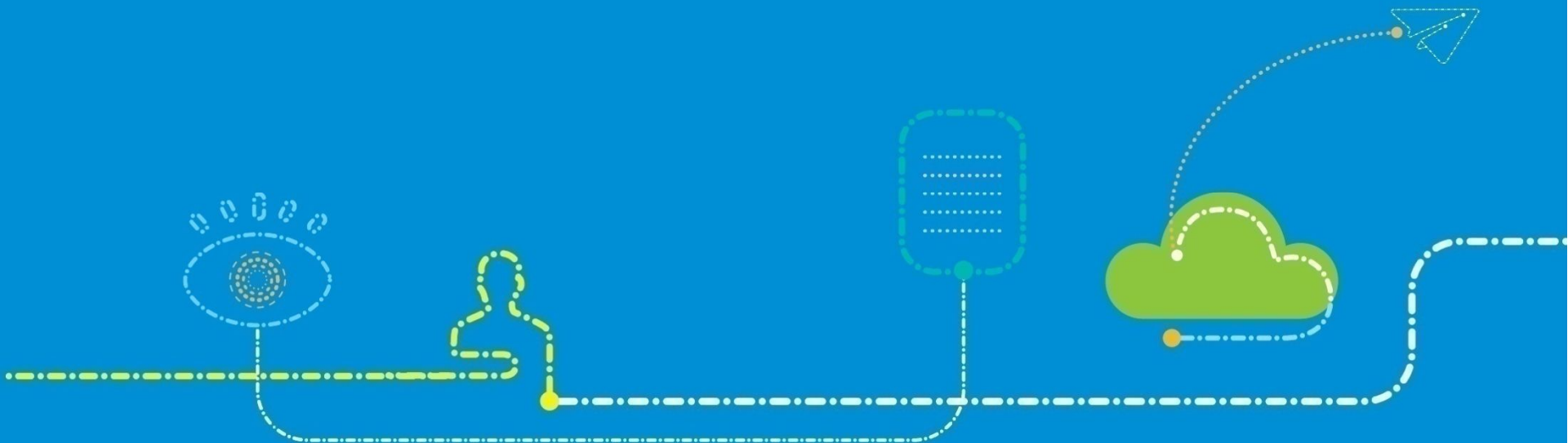


# Motivation for new Work Item on D2D communication for commercial use cases



# Motivation (1/2)

In R12 and R13, the standardization of Proximity Services using LTE D2D communication has focused on the public safety use cases.

- D2D communication was designed to operate with few UEs transmitting VoIP messages, which is the most typical public safety use case.

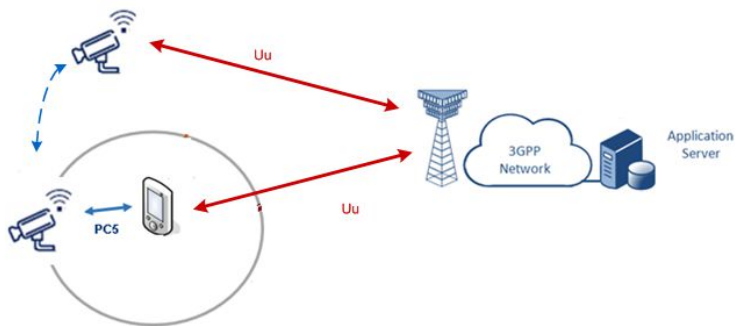
However, a number of commercial use cases could benefit from D2D operation (and specifically from the sidelink relay procedure):

- To minimize power consumption of devices in bad coverage
- To increase data rates of devices at cell edge allowing a more uniform user experience

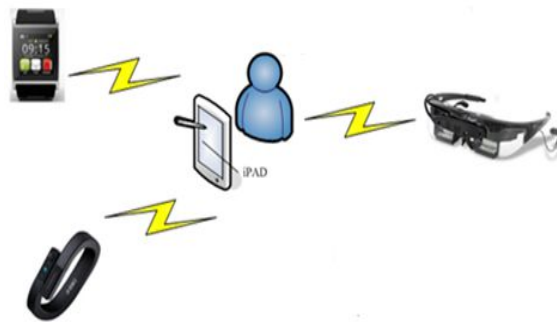
## Motivation (2/2)

### Support for MTC (including wearable) devices:

- Transfer of UL/DL data for MTC devices via a relay UE to optimize power consumption
- Wearable devices could connect via PC5 to a smartphone (relay UE) and then to the network



MTC devices could connect to the network directly or via a relay UE



Wearable devices could connect to the network via a smartphone

This can be achieved with limited enhancements to Rel-13 D2D communication:

- No study phase is considered as needed to specify the required enhancements

# Work Item scope

Compared with the Rel-13 D2D communication solution for Public Safety use cases, one main assumption for commercial use case is that all the devices are in coverage:

- All UEs read system information and paging from the eNB
- (Relay based) sidelink communication is utilized by the UEs for user plane data transfer, to increase data rate and reduce power consumption

Commercial scenarios require support for higher data rates, capacity and reliability:

- L1/L2 improvements are needed for sidelink unicast communication.

Considering the various emerging services in commercial scenarios, it is essential to introduce enhancements to improve the user experience:

- Enhancements to PC5 signalling.
- Bearer level QoS support for sidelink communication similar to WAN is needed.

# Sidelink unicast communication enhancements

## Objective:

- Higher data rate and reliability

## Basic ideas:

- Instead of fixed number of transmissions, the transmitting UE may receive the ACK/NACKs from receiving UE to determine whether a re-tx should be performed.
- The transmitting UE may adjust its MCS and transmission power used for sidelink communication based on the sidelink quality measurement or feedback from the receiving UE.

## Specification impact:

- AM mode sidelink transmission
- Adjustable MCS and transmission power control
- Sidelink quality measurement and report

# PC5 Signaling procedures (connection to a relay)

## Objective:

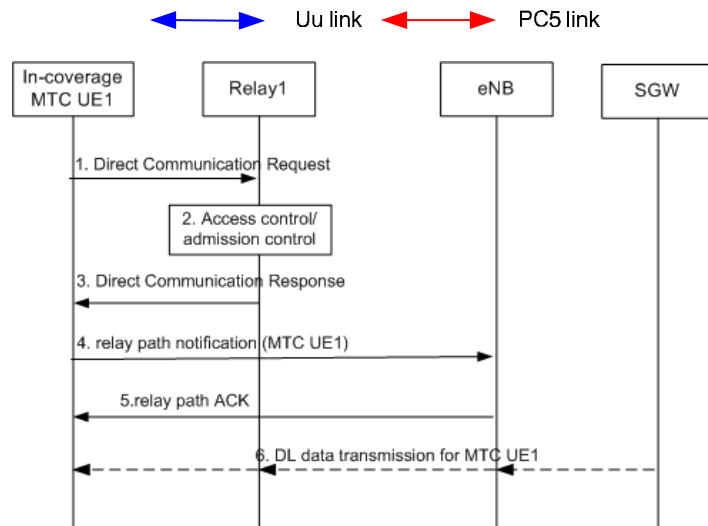
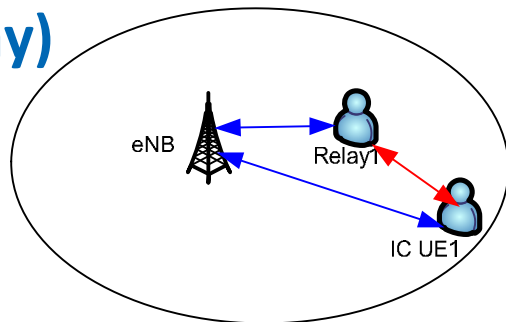
- Better network control for simultaneous PC5 and Uu connections for remote UEs

## Basic ideas:

- Remote UEs remain directly reachable by the network. Control signaling is received from the eNB. Remote UEs connect to a relay UE for UL/DL user plane data transfer.
- AS layer access control and admission control is enabled to support massive connections from MTC devices.

## Specification impact:

- Enhancements to PC5 signaling procedures, with AS layer access control and admission control
- Network controlled QoS configuration for PC5 bearers
- eNB aware PC5 connection setup (eNB should record the routing info for the remote UE so that when a DL data packet arrives for the remote UE, it should route it via the corresponding relay)



# Overview of the objectives

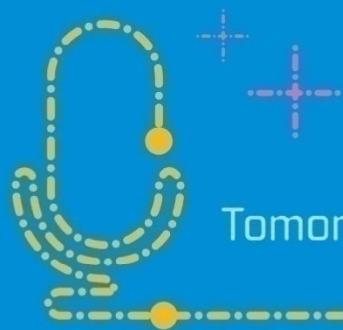
## Sidelink unicast communication with higher data rate and reliability:

- Acknowledged Mode sidelink communication / L2 feedback and re-transmission
- Adjustable MCS and power control optimizations
- Sidelink communication measurement and report

## QoS enhancement for sidelink communication:

- Enhancements to PC5 signaling procedures, with AS layer access control and admission control
- Network controlled PC5 connection setup and parameter configuration
- Network controlled QoS support for sidelink communication

# Thank you



Tomorrow never waits

