

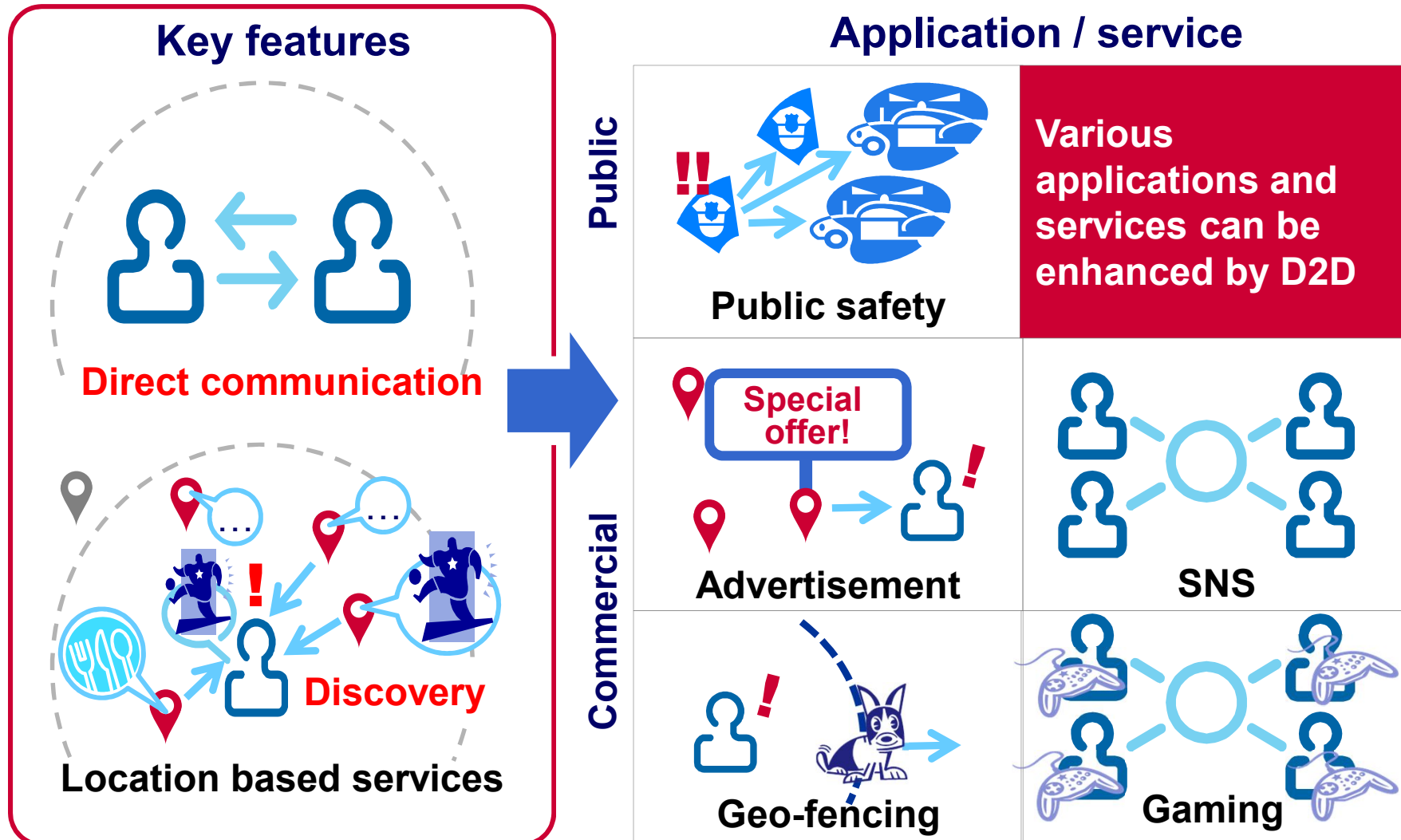
# **Device to Device (D2D) proximity service in LTE**

NTT DOCOMO, INC.

# Background

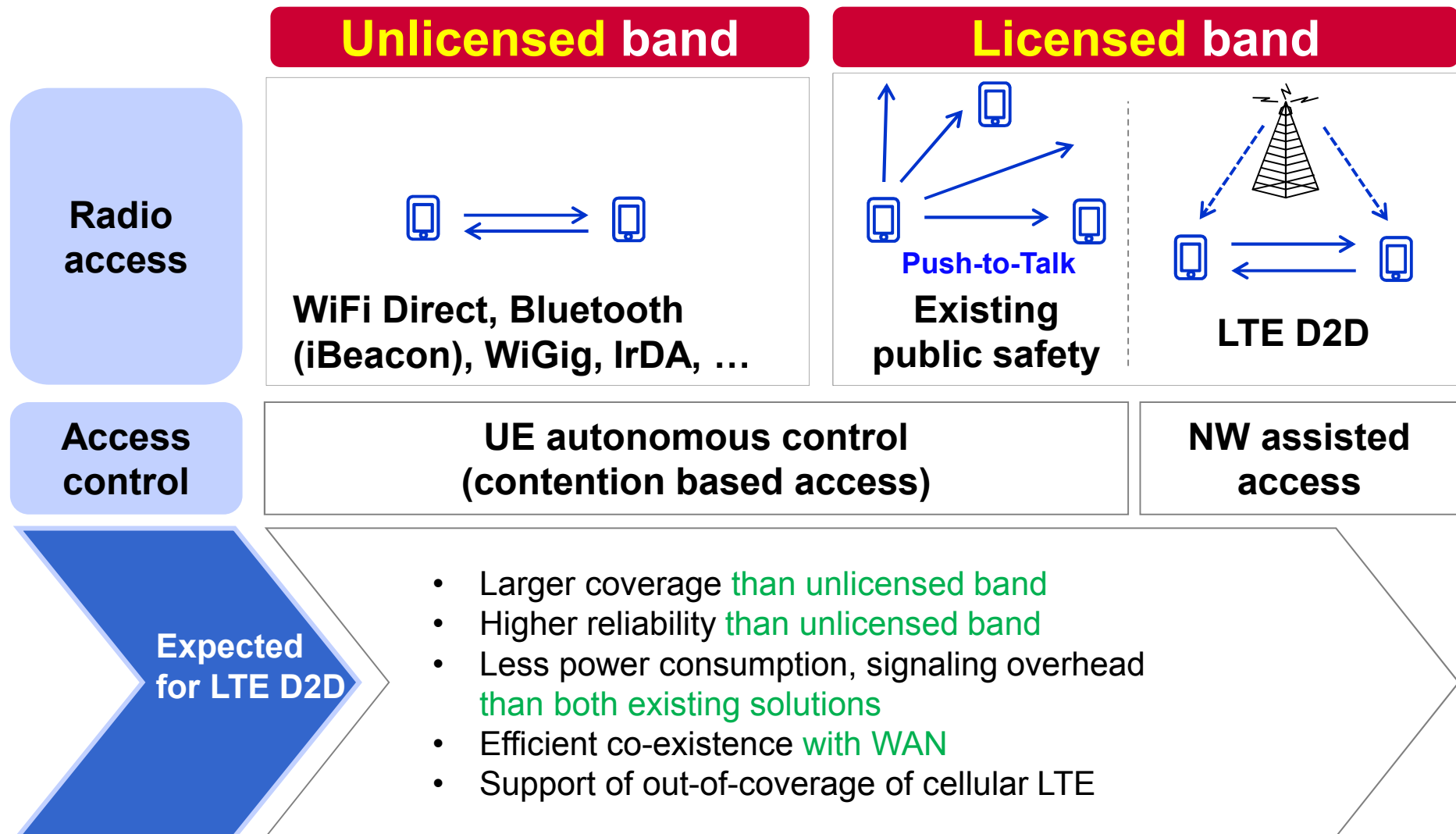
## – Use Case of D2D

### D2D (Device to Device proximity services)

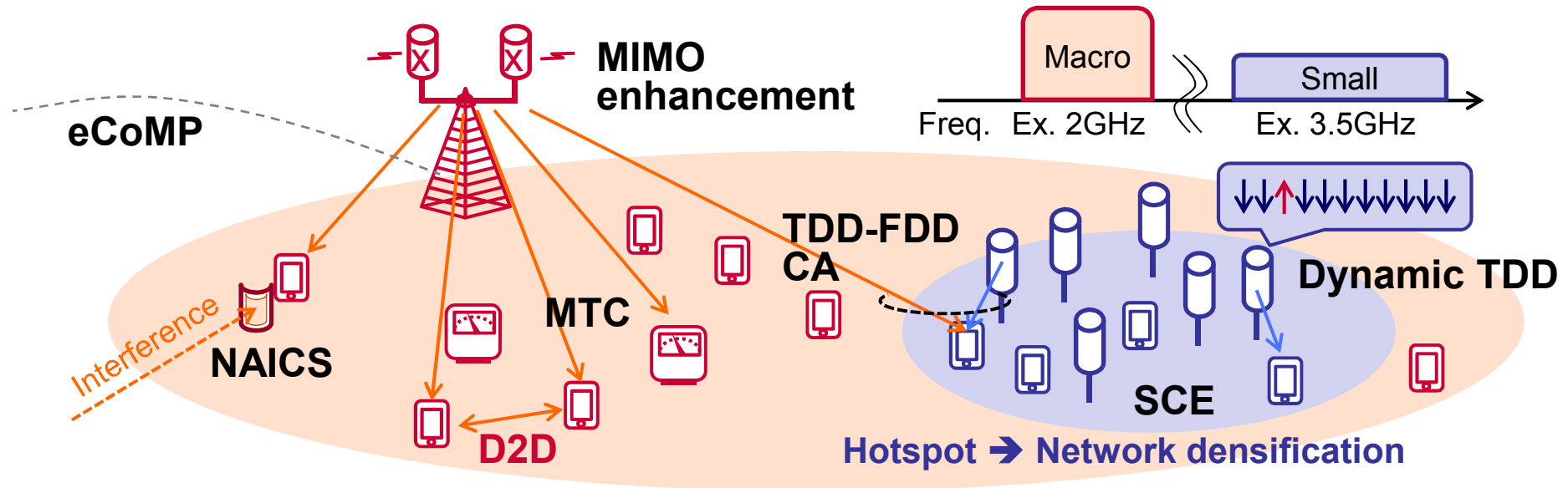


# Background

## – Spectrum scenario of D2D



# LTE Release 12



## Service oriented enhancements

- **D2D (Device to Device) communication/discovery**
- MTC (Machine Type Communication)

## Enhancements for higher spectrum efficiency

- NAICS (Network Assisted Interference Cancellation and Suppression)
- MIMO enhancement
- eCoMP

## Small cell

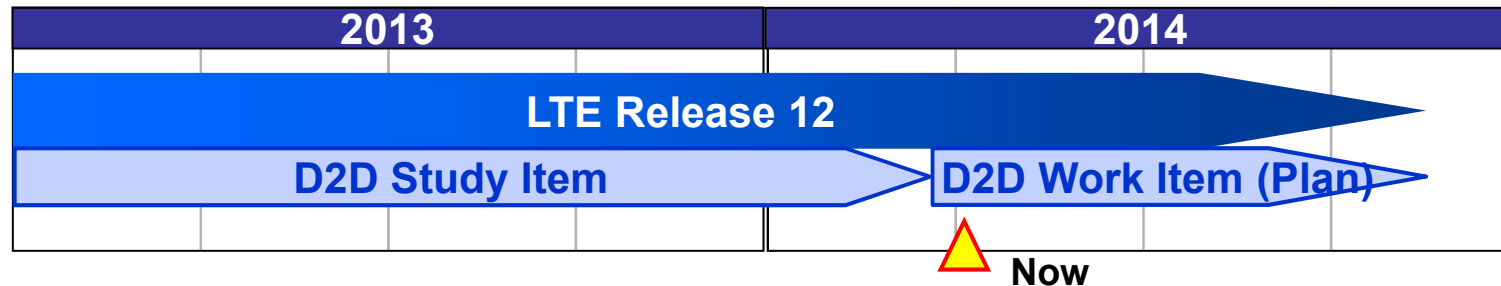
- High capacity
- High traffic fluctuation
- Low Tx power node
- (TDD with higher frequency band)

## Small cell related enhancements

- TDD-FDD CA (Carrier aggregation)
- SCE (Small cell enhancement)
- Dynamic TDD

# Device to Device (D2D) proximity service in Rel-12 LTE

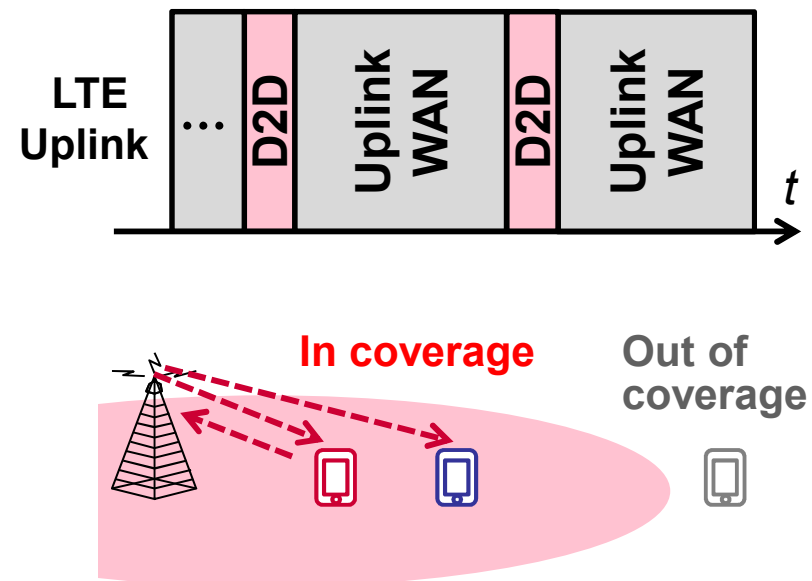
Rel-12 LTE schedule



## ■ D2D in LTE

- Discovery and communication is supported
- Use LTE uplink spectrum/resource
- NW assisted configuration for D2D
  - eNB as synchronization source
  - Resource pool configuration
  - Dynamic resource allocation

➔ Efficient operation in-coverage



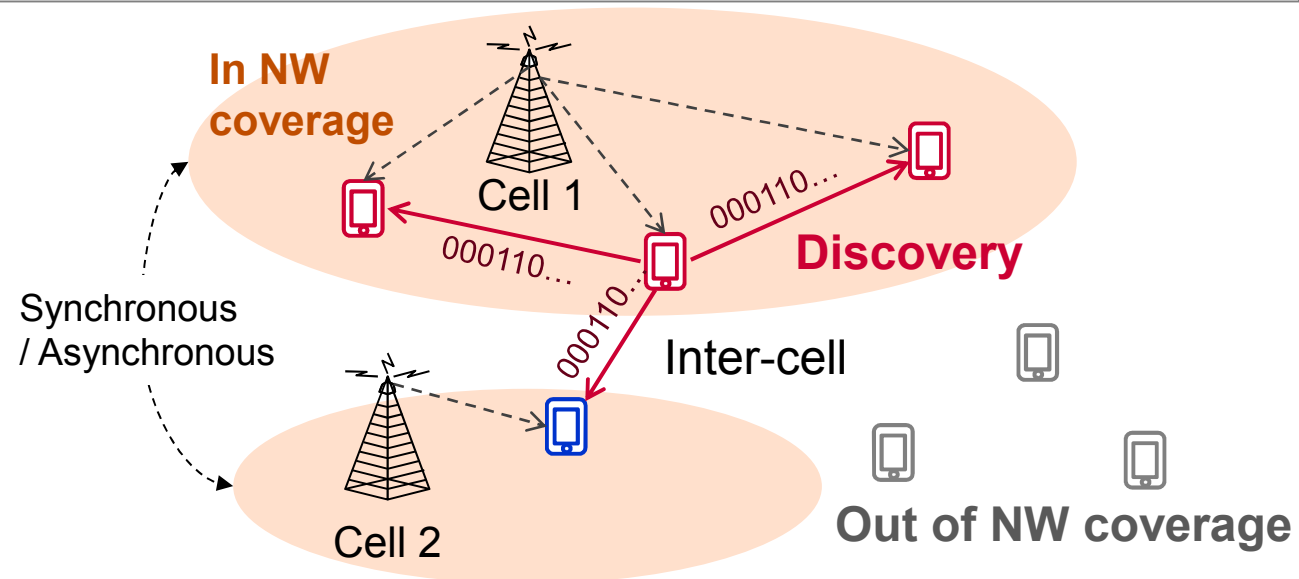
# Rel-12 D2D Discovery

## ■ Discovery in Rel-12 LTE

- Message transmission over UL data channel (Physical UL shared channel (PUSCH)) based signal
  - E.g., message = Prose (proximity service) UE ID and Prose Application ID.
- Receiving UE can detect multiple messages
  - Upper layer filtering for detected messages assumed

## ■ Scenario

- Intra-cell and inter-cell
- In coverage is supported. **No out of network coverage discovery**



# Rel-12 D2D Communication

## ■ Communication in Rel-12 LTE

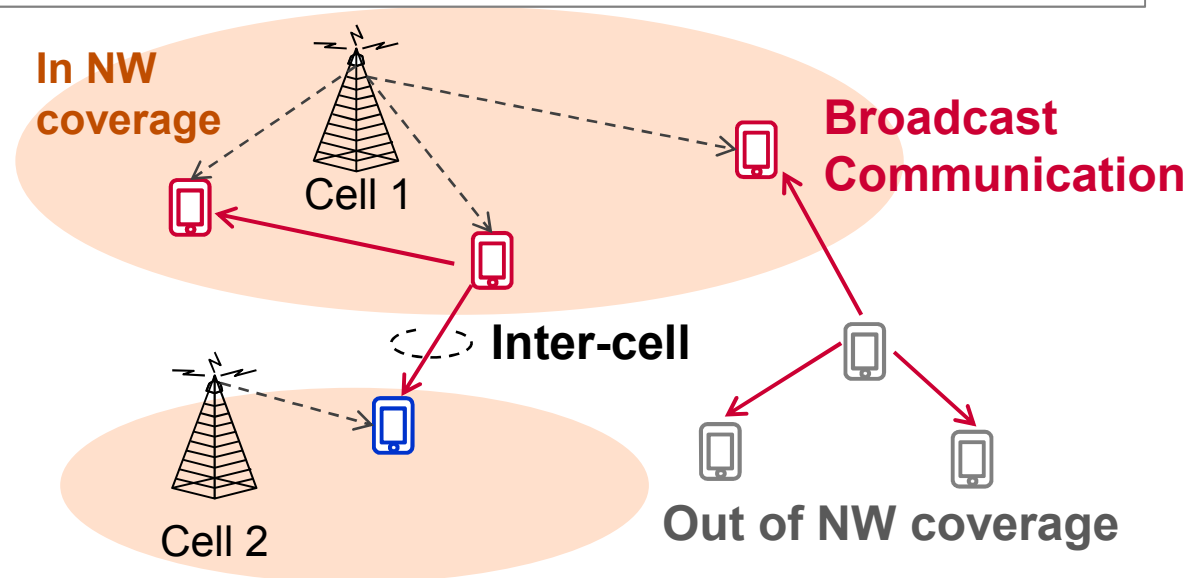
- Broadcast only
- SA (Scheduling Assignment) and data will be sent for communication

## ■ Target service

- Targeted to apply only to public safety
- Non-public safety service could be supported for economy scale

## ■ Target scenario

- Intra-cell and inter-cell operation
- In coverage and out of coverage is supported



- Specification work of D2D discovery/communication for LTE release 12 is ongoing
  - **Basic design**
    - Use LTE uplink spectrum/resource
    - Physical Uplink Shared CHannel (PUSCH) based signal design
      - » Single carrier FDMA based multiple access
    - Network assisted configuration
  - **Scope**

	Intra-cell / inter-cell	In coverage / out of coverage
Discovery	Both	In coverage only
Communication	Both	Both