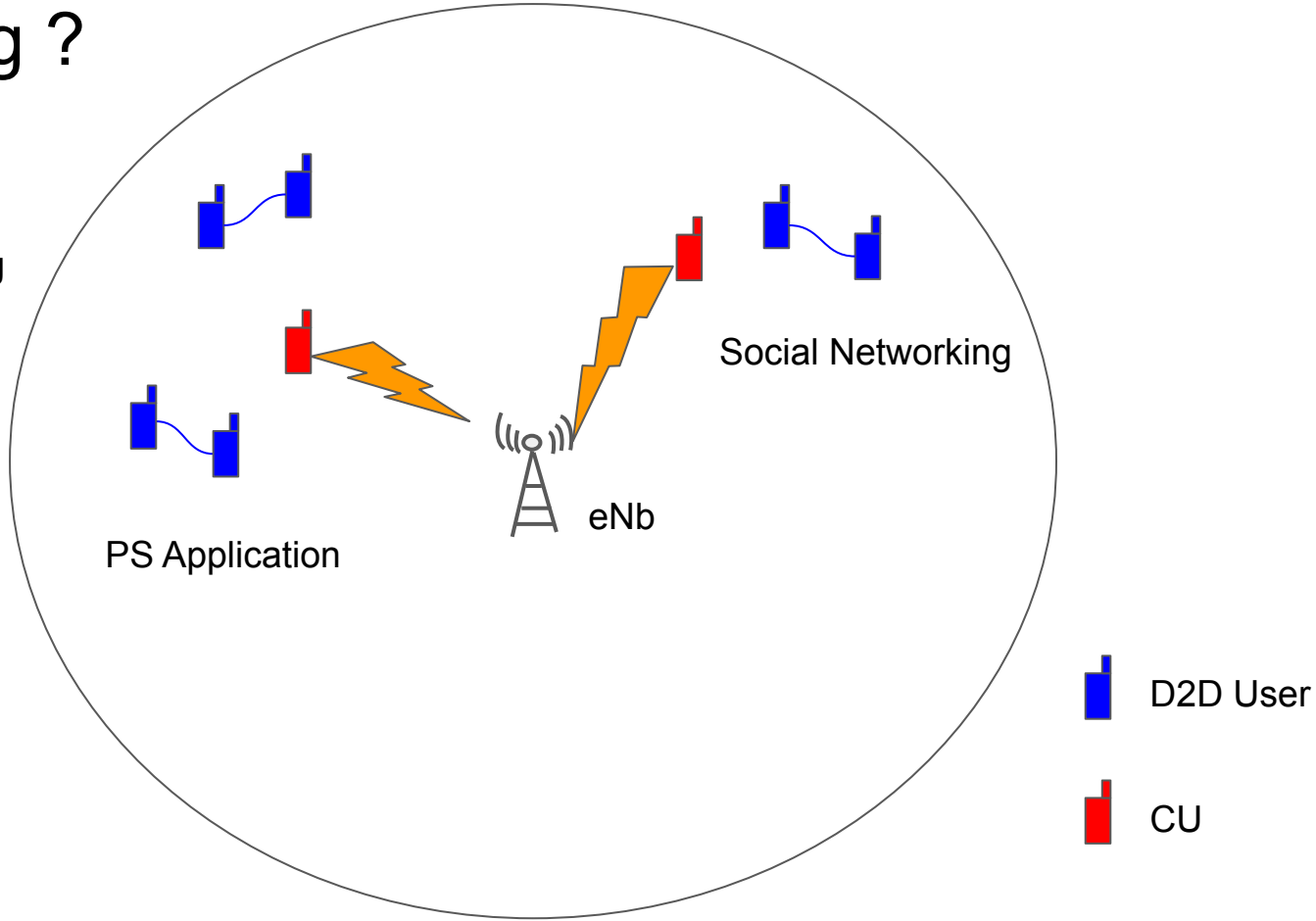
Course Project

IT200 - CCN

- Marks - 40
- Group of max 4.
- Course Project Evaluation - Immediately After End Sem theory exams.

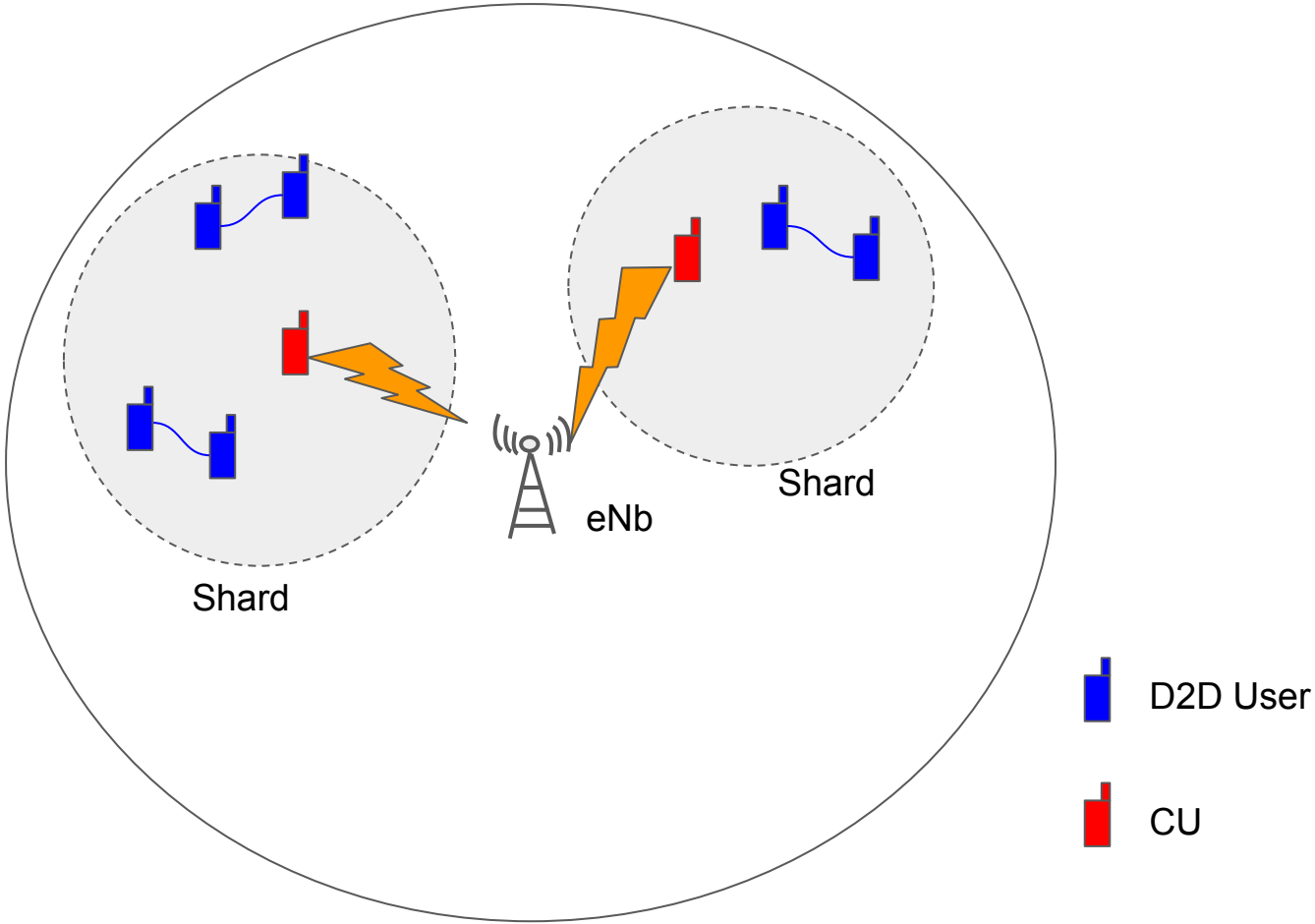
Why Sharding ?

Sharding is the new clustering



Why Sharding ?

- eNB has to check the type of application before the resource allocation
  - Whether they are first responders ?
    - Many PS applications are there
  - The first responders has to be given more preferences.
- Checking every time the type of application
  - Differentiating PS applications with the commercial application - takes time.
  - Additional responsibilities for the eNB


Shard
eNb
Shard
D2D User
CU

After Sharding

- All D2D pairs will be put in to different shards based on their application.
- $Shard_i$ - PS application
- $Shard_j$ - Commercial Application
- If a resource request comes from $Shard_k$
  - eNB immediately knows, whether it is a PS or commercial application.
  - Without taking much time, eNB can allocate resource.

Sharding Methods

- Clustering methods
- Partitioning clustering
  - K-Means Clustering
  - Quality Threshhold Clustering
  - Expectation Maximization Clustering
  - Mean shift

Experiment 1:

1. The available Device to Device (D2D) pairs should be sharded (cluster) based on the application, Public Safety and Commercial Applications. For Sharding, any clustering algorithm can be considered.

2. A shard may contain any number of D2D Pairs.

3. Each shard should have at least one Cellular User (CU).

4. Display the shard members.

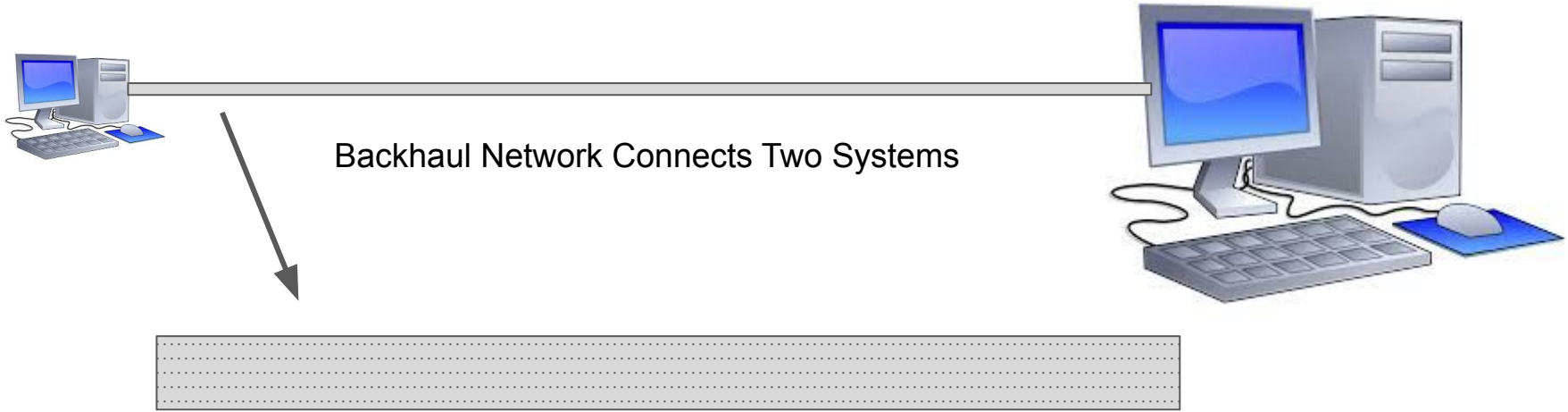
The Results Expected

- Shard Display.
- Which clustering algorithm is used ?
- Why ?

SINR

- Signal to Interference plus Noise Ratio (SINR).
  - Some times called as SNIR
- Gives upper bound on channel capacity.
  - Signal Quality
- Ratio between the actual signal and unwanted interference and noise.
- Very important in Wireless Network.
  - Why ?

A Wired Network Scenario



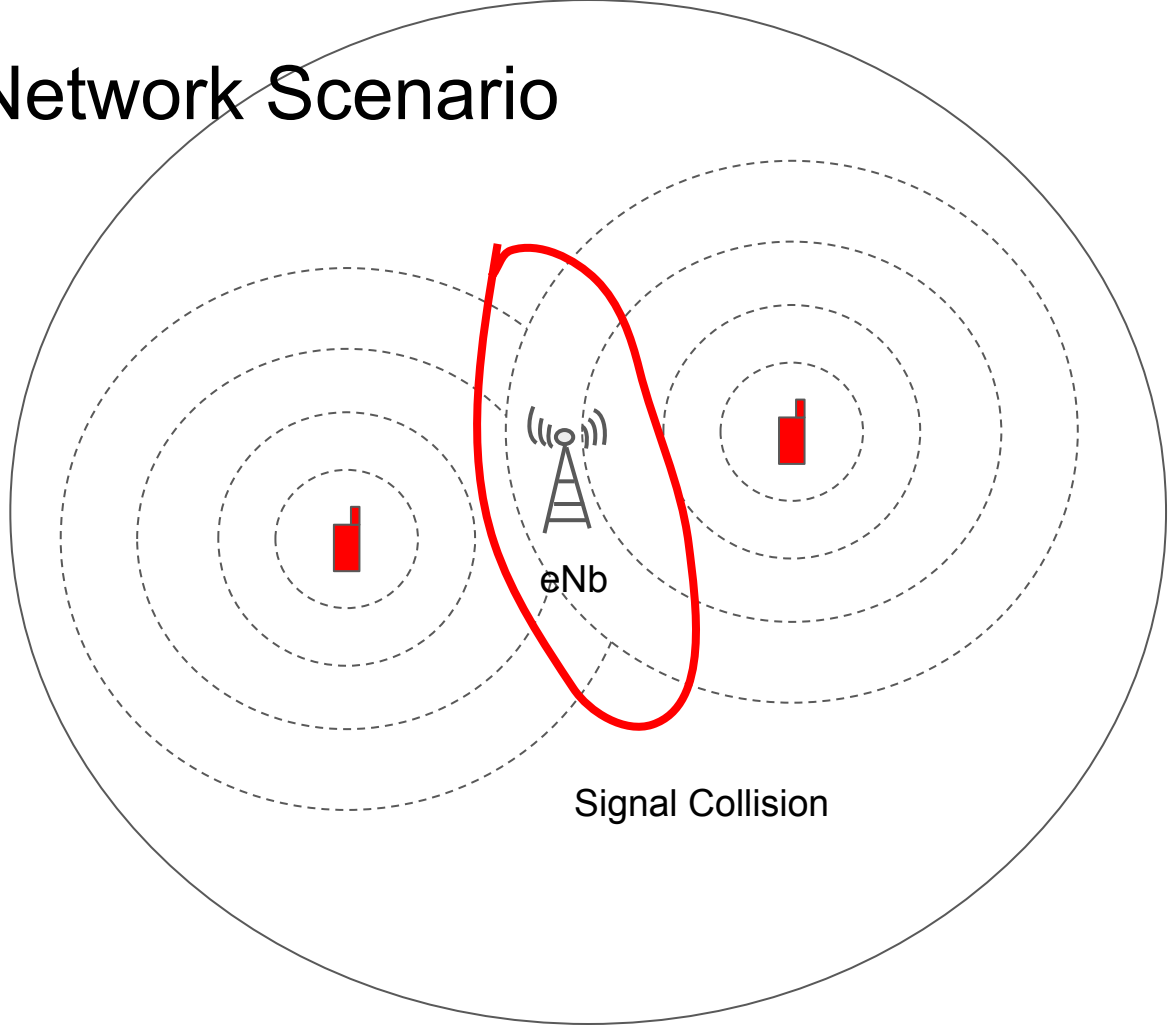
Backhaul Network Closer Look

Signals

- Clear Separation of Signals
- No signals collisions/interference

A Wireless Network Scenario

Signal Transmits in 360^0



Difference Between Interference and Noise

- Noise - Unwanted signals
- Can be caused by
  - Signal - capture, storage, transmission, processing, or conversion
- Interference - Unwanted Noise
  - Caused by other near by signals.
- SINR - Interference + Other Noise

Why SINR ?

- Influences the data rate.
- Channel capacity will be known, thereby you can adjust the data rate.
- You can reduce the Tx power to reduce the interference.

How to calculate SINR in NS3 ?

- Should be calculated @ the destination node
- Based on the received signals.
- Follow the youtube videos.

Experiment 2

- Based on the Shards formed in the previous experiment
- Start the D2D communication at regular intervals (1 sec)
- Take the default attributes.
- Find the SINR at specified time.