

# Cross-Communications

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# Cross-Communications (CC)

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# At a glance

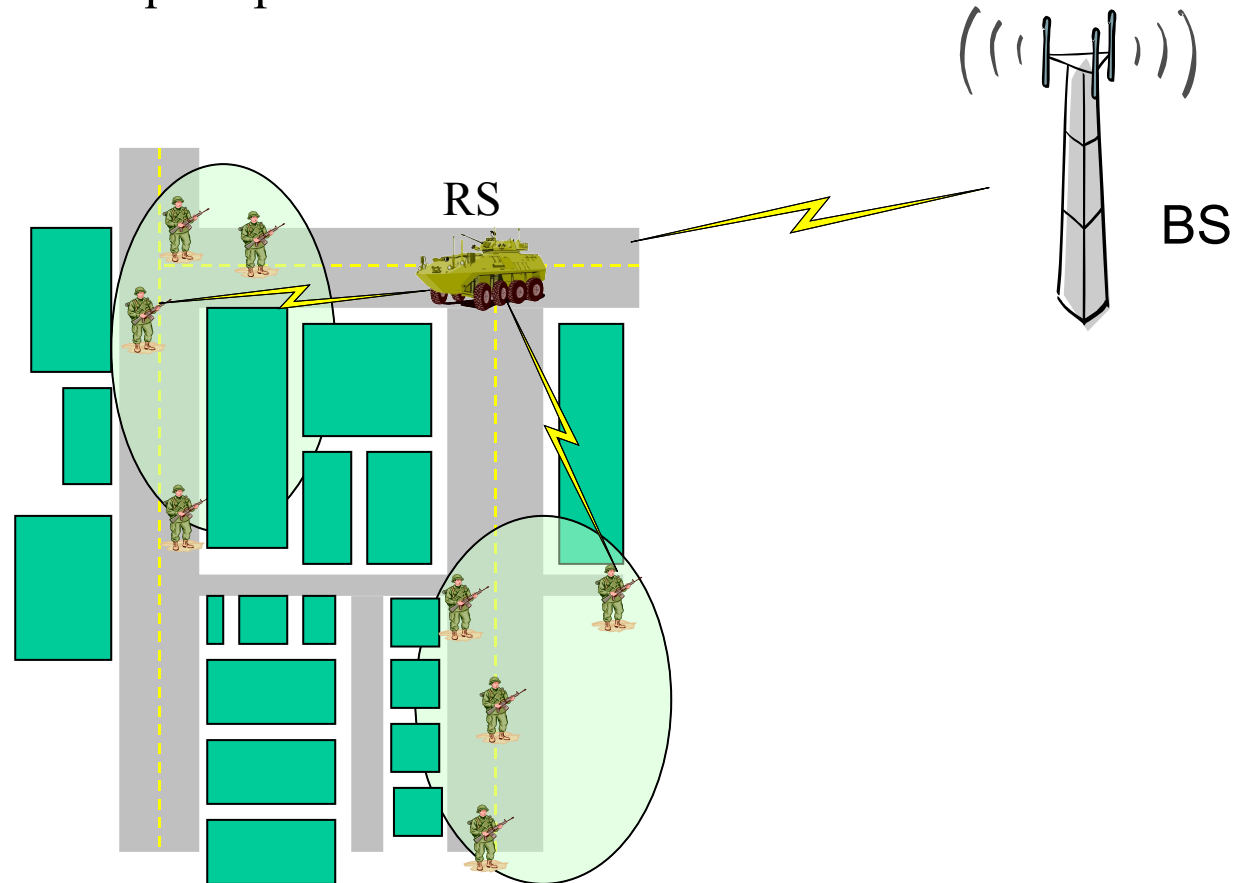
- Objectives
- Typical scenarios for Cross-Communications
- Advantages
- Short description
- Summary
- Comments on technical requirements

# At a glance

- Cross-communication is to allow mobiles to communicate with each other via relay without going through the MMR-BS.
  - It is designed to minimize the overhead and delay for data transmissions
  - It is proposed as an optional communication mode
- Take advantage of the infrastructure provided by the interconnection of the RS
  - Extending RS Capabilities => Forwarding capabilities
- No modifications are required to BS operations
  - The BS still keeps control of the whole network
    - RSs are not Autonomous, they obey BS policies
    - Scheduling, Routing are managed by the BS and only enforced by the RS.

# Scenarios

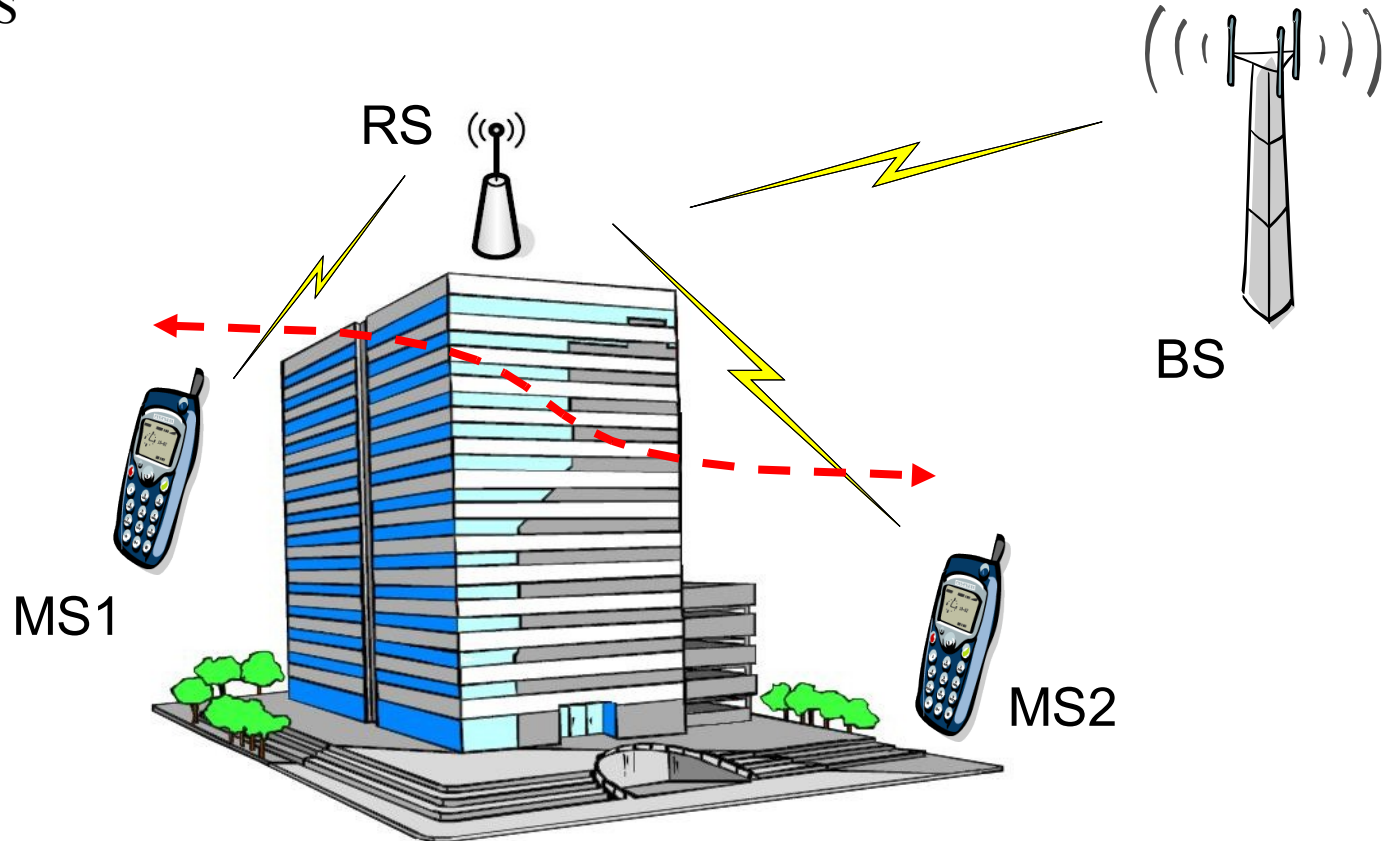
- **Example 1 : Military communication**
  - Mobile user (e.g. soldier) communicates with another mobile user within the same squad/platoon



# Scenarios

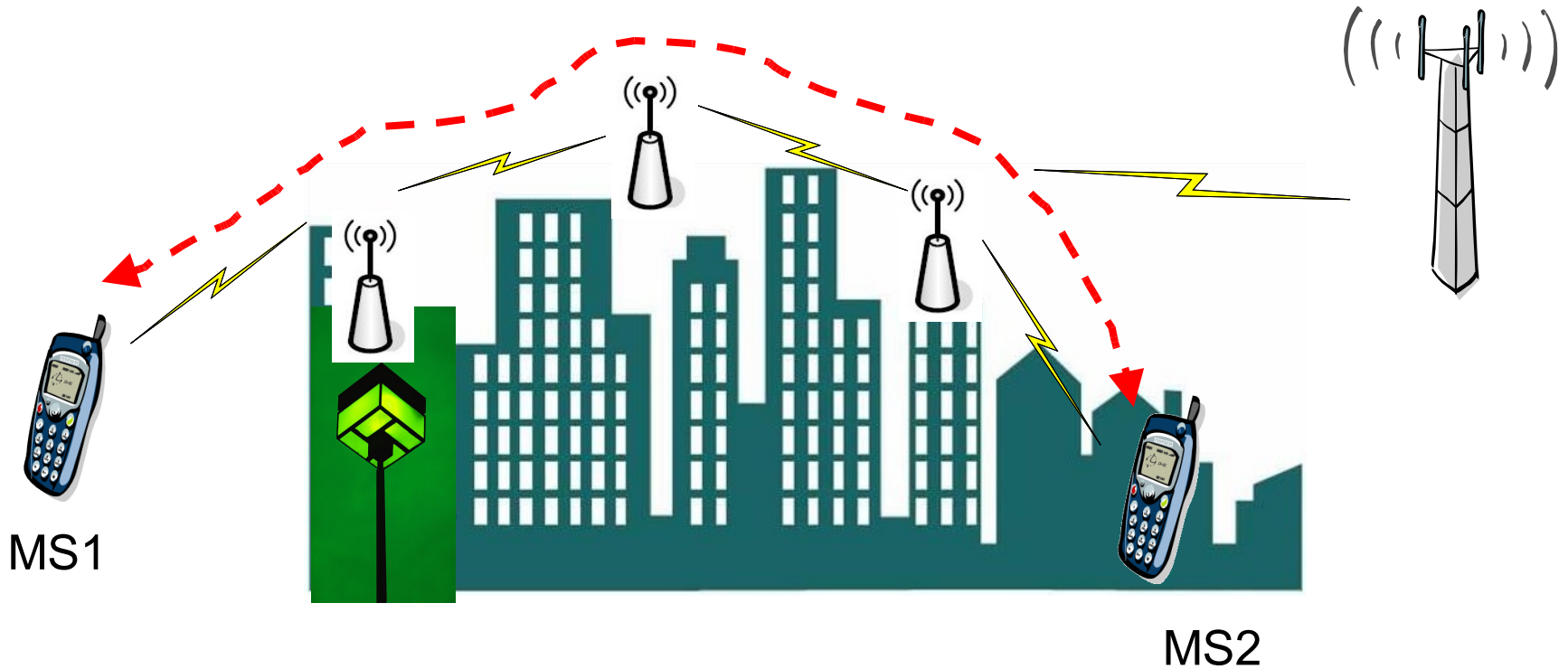
- **Example 2 : Communication in an office**

- Two MSs are located in the same building (same RS cell)
- RF efficiency improved since data doesn't need to be transferred to the BS



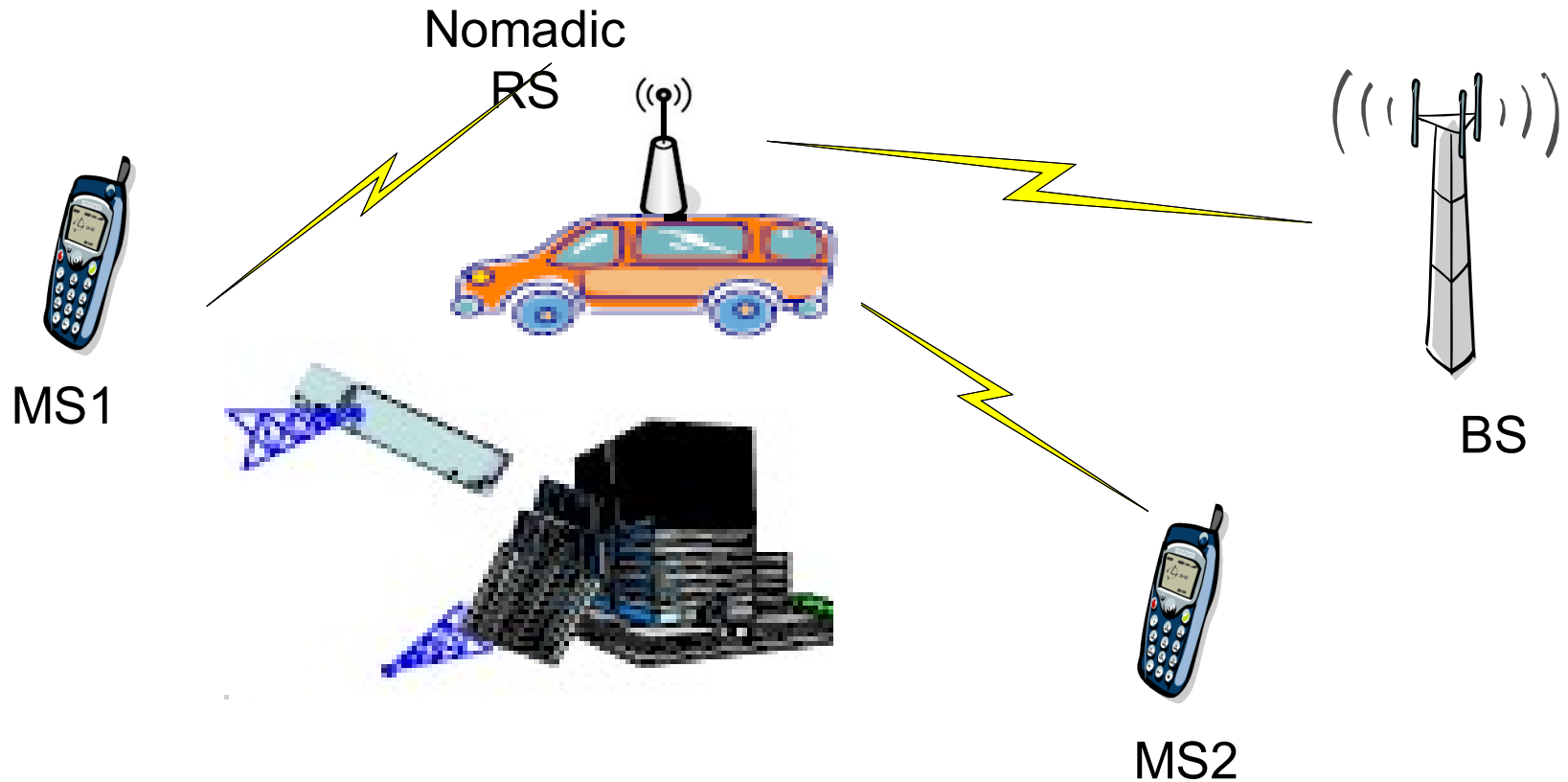
# Scenarios

- **Example 3** : Communications among different RS cells
  - Two MSs are located in the same MMR cell but different RS cells



# Scenarios

- **Example 4** : Emergency/Recovery situation



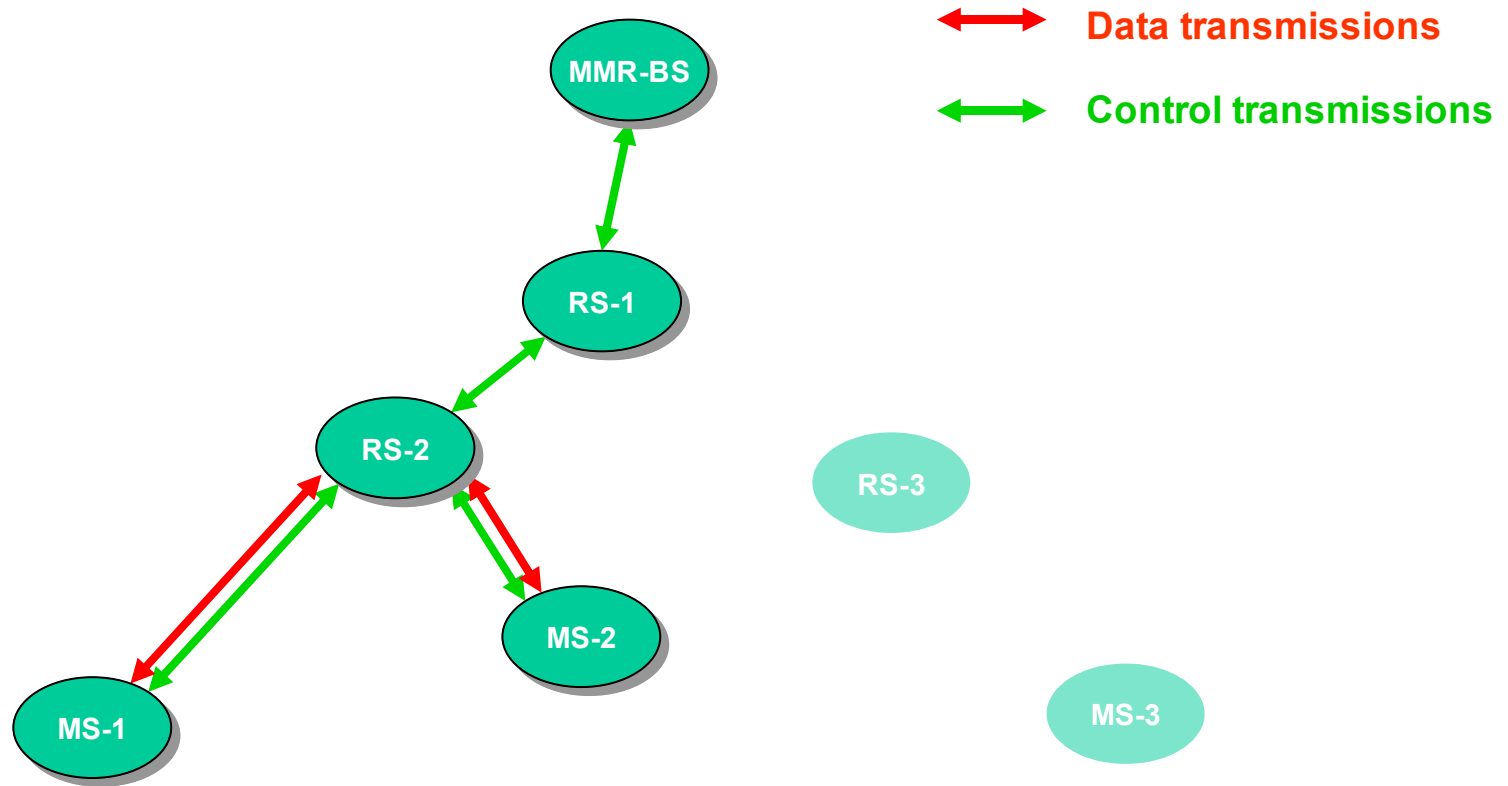


# Advantages

- Bandwidth efficiency
  - Civilian applications
  - Military applications
- End-to-end delay minimization
  - Real-time applications (voice, video conference...)
  - Public safety applications
  - Military applications

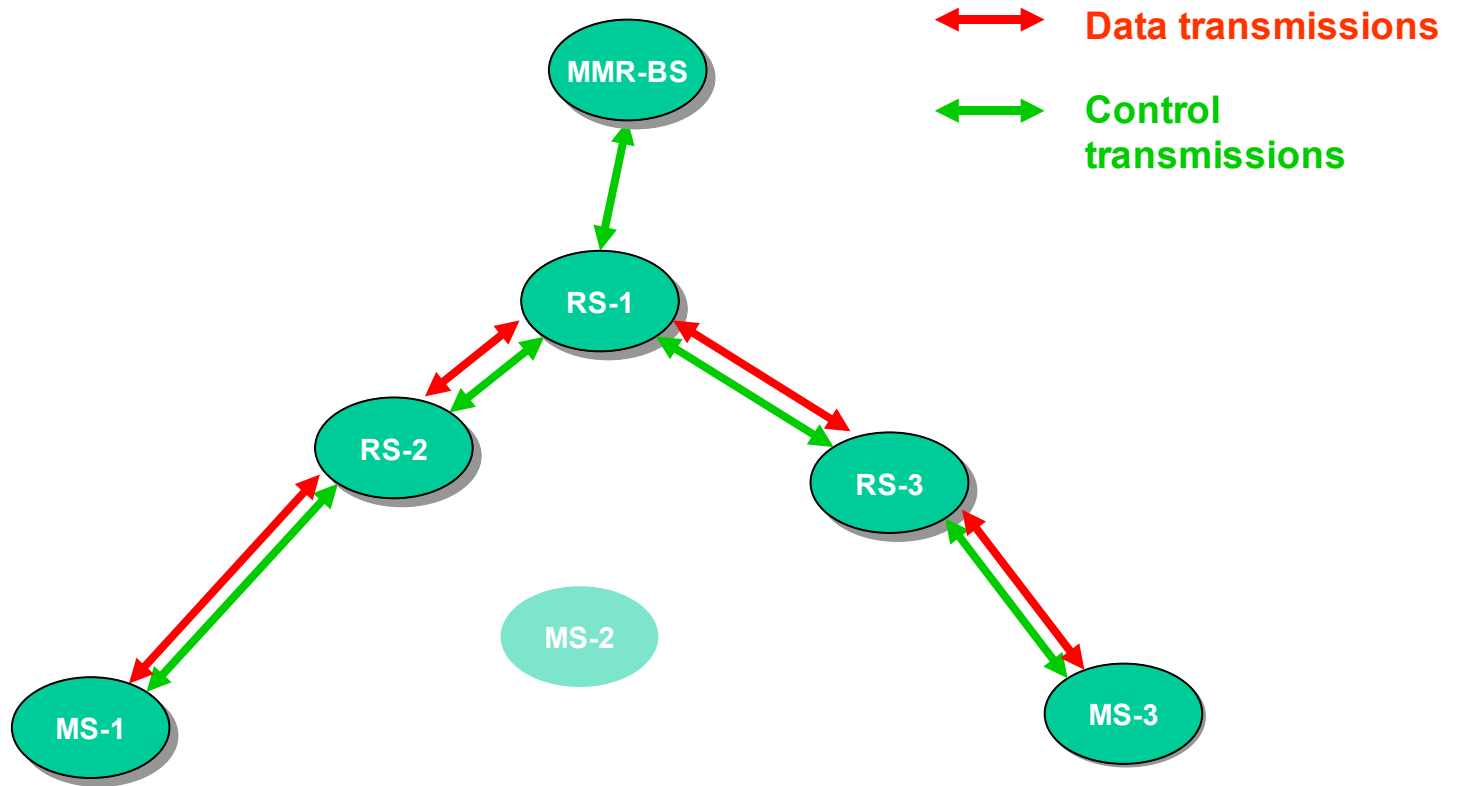
# Short description

- Cross-Communication procedure is controlled by the BS
- Data transfer only passes through 1 RS



# Short description

- Data transfer can go through multiple RSs in MMR cell



# Short description

- CC doesn't require any modification to the MS
  - It requires connections between MS and BS
  - 2 CID are used for 1 Cross-Communication
- The topology is still a **tree** (not a mesh)
- CC authorization is based on the following conditions
  - Involved RSs have CC capabilities (optional feature)
  - CCs is allowed by the infrastructure owner policy
  - BS authorizes CC for given CID's...
  - CC can be disabled when call interceptions are requested

# Summary

- Cross-Communications could be an optional mode
  - It doesn't have to be implemented
- CC bring many advantages
  - Bandwidth efficiency (significant for service providers):
    - CAPEX optimization
  - Delay minimization
  - BS processing load is reduced for data traffic
- It is compliant with the 802.16j objectives
  - A connection is set up between MS and BS
  - The topology is a tree
  - No changes required in MS
- CC procedure is controlled by the BS

# Comments on technical requirements

- M15 : MAC PDU processing
  - **Set RS to Optional**
  - The optional use of CC requires MAC PDU processing in the RS
- O1 : Relay path selection
  - **Add the sentence “The path selection mechanism must also be capable of setting up and maintaining separate paths for control and data”**
  - Optionally paths for control and data can be different when using CC