Technical requirements for 802.16j

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Purpose:

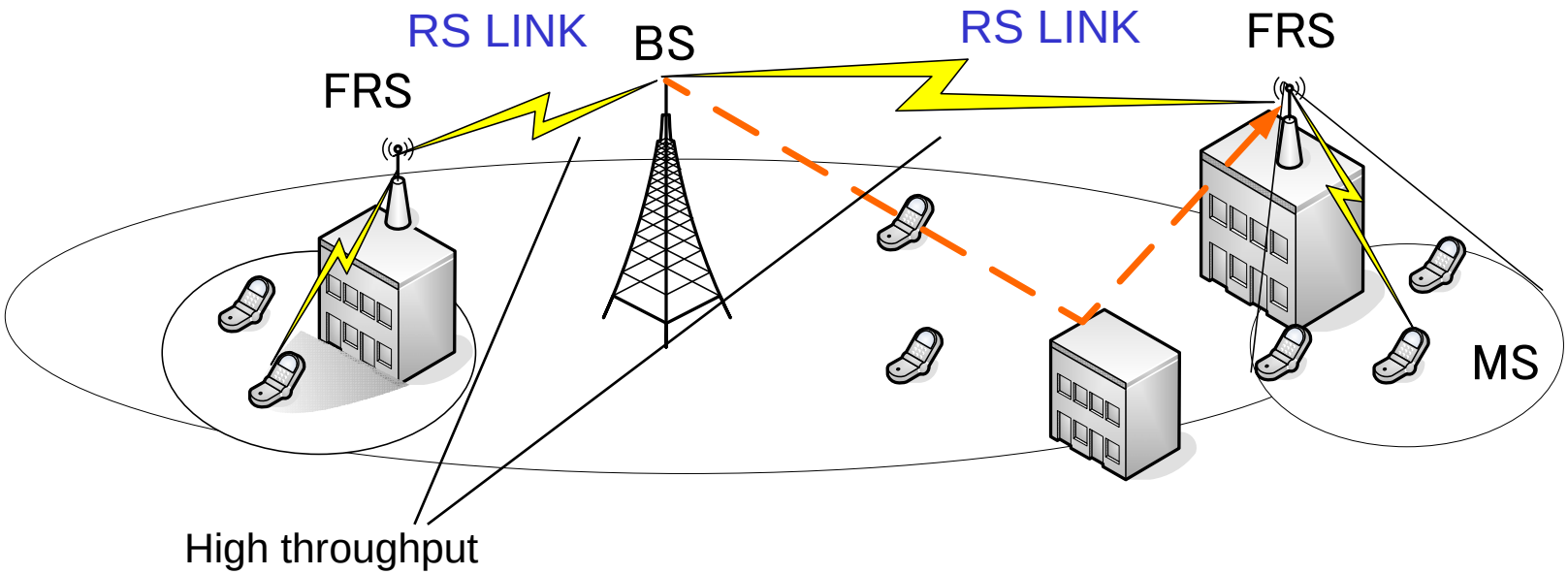
To list the technical requirements for 802.16j.

Outline

- Usage Scenario
  - ✓ Secnario1: Fixed RS (FRS)
  - ✓ Scenario2: Nomadic RS (NRS) in the building
  - ✓ Scenario3: Nomadic RS (NRS) in the field
  - ✓ Scenario4: Mobile RS (MRS)
- Technical challenges / Requirements in Brief
- Technical Requirements

Scenario 1: Fixed RS (FRS)

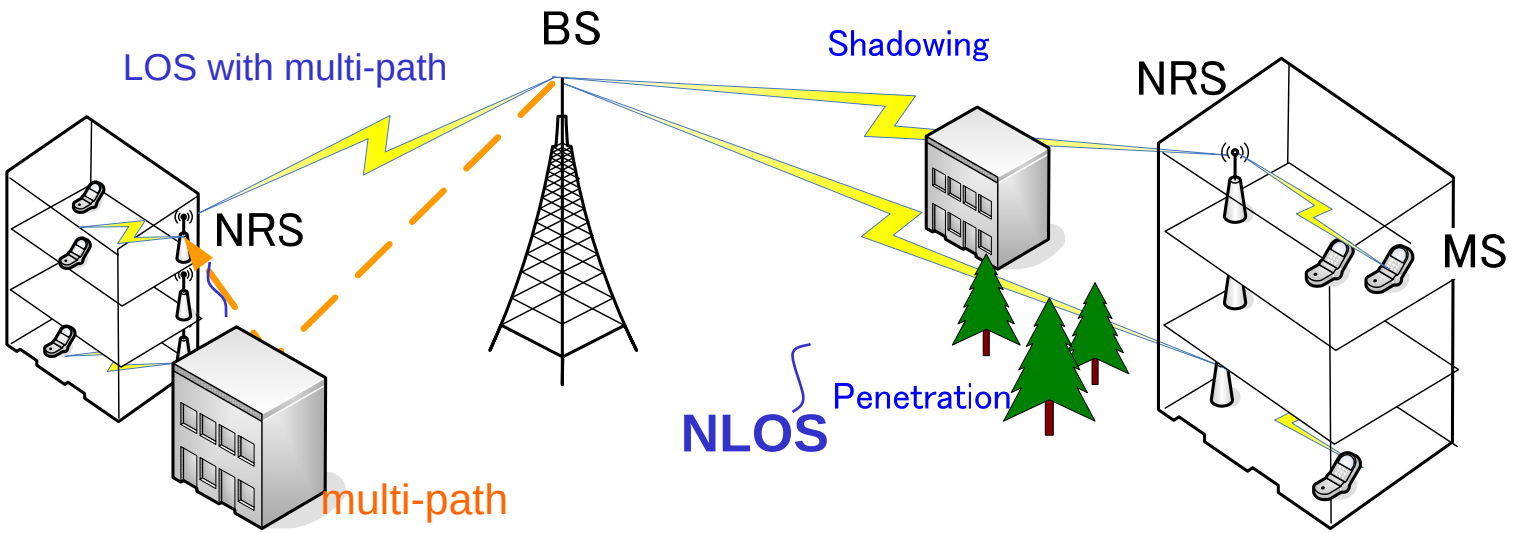
- FRS are deployed for coverage extension and reducing coverage holes,
  - ✓ The RS link requires high throughput in LOS/NLOS (line of sight/non line of sight) environment
  - ✓ RS link shall provide an efficient and reliable data communication scheme
  - ✓ RS link shall limit added delay and jitter variance especially under heavy traffic



The RS link (BS-RS or RS-RS) shall provide a mechanism that enhances its reliability, efficiency and throughput while minimizing delay and delay jitter in a LOS/NLOS environment for a fixed RS

Scenario 2: Nomadic RS (NRS) in the room

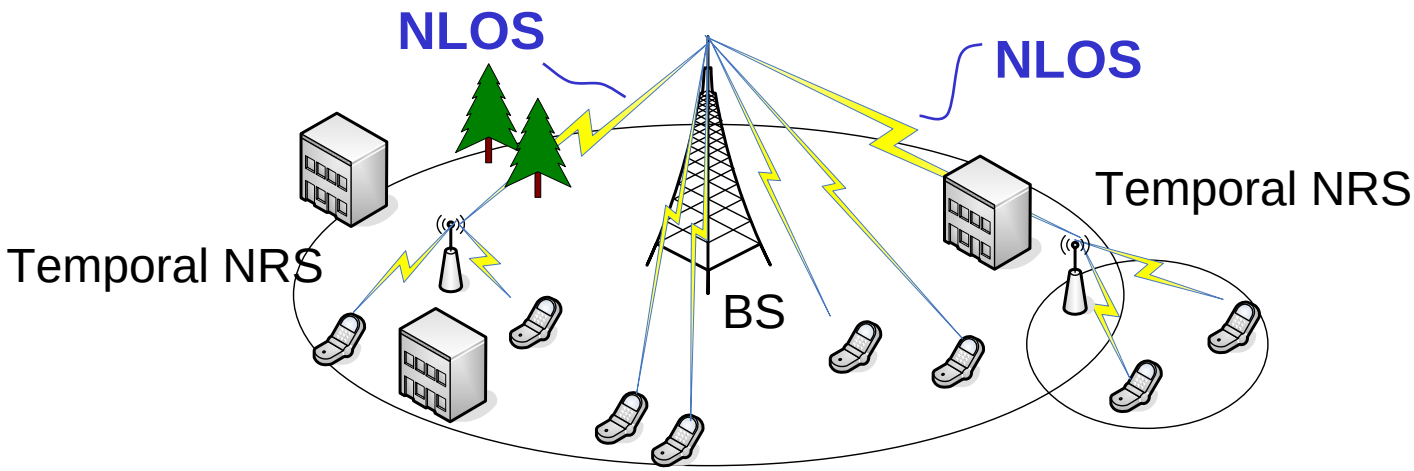
- NRSs are deployed for coverage extension into the building
  - ✓ The RS link requires high throughput in LOS/NLOS (line of sight/non line of sight) environment
  - ✓ RS link shall provide an efficient and reliable data communication scheme
  - ✓ RS link shall limit added delay and jitter variance especially under heavy traffic
  - ✓ NRS is deployed near the window in the building , and relays packets to the MSs (Mobile stations) in the room.



The RS link (BS-RS or RS-RS) shall provide a mechanism that enhances its reliability, efficiency and throughput while minimizing delay and delay jitter in a LOS/NLOS environment for a nomadic RS

Scenario 3: Nomadic RS (NRS) in the field

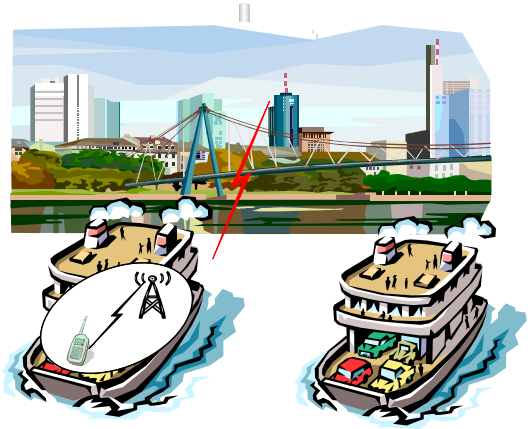
- NRSs are deployed for tentative coverage extension
  - ✓ The RS link requires moderate to high throughput in NLOS environment
  - ✓ RS link shall provide an efficient and reliable data communication scheme
  - ✓ NRS is nomadic (on the emergency vehicle for example), and relays packets to the MSs around the NRS.
  - ✓ NRS is deployed at a special location temporarily (event spots for example) to fill coverage hole temporary or permanently
  - ✓ Reduce ACK delay under heavy traffic loading

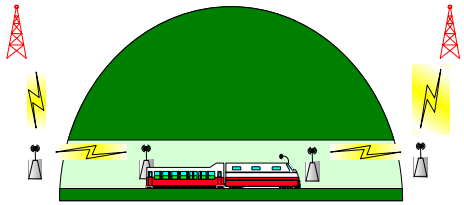


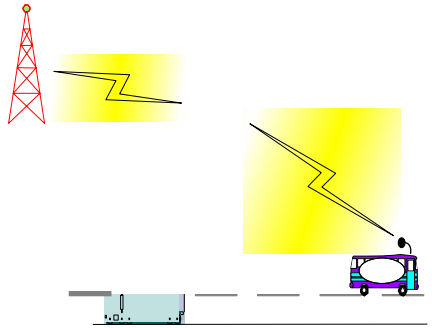
The RS link (BS-RS or RS-RS) shall provide a mechanism that enhances its reliability, efficiency and throughput while minimizing delay and delay jitter in a LOS/NLOS environment for a nomadic RS

Scenario 4: Mobile RS (MRS) in the field

- NRSs are deployed for tentative coverage extension
  - ✓ The RS link requires moderate to high throughput in NLOS environment
  - ✓ RS link shall provide an efficient and reliable data communication scheme
  - ✓ MRS is a mobile HUB (on the train for example), and relays packets to the MSs around the MRS.
  - ✓ MRS handover is seamless and shall be able to initiate handover for itself
  - ✓ Reduce ACK delay under heavy traffic loading



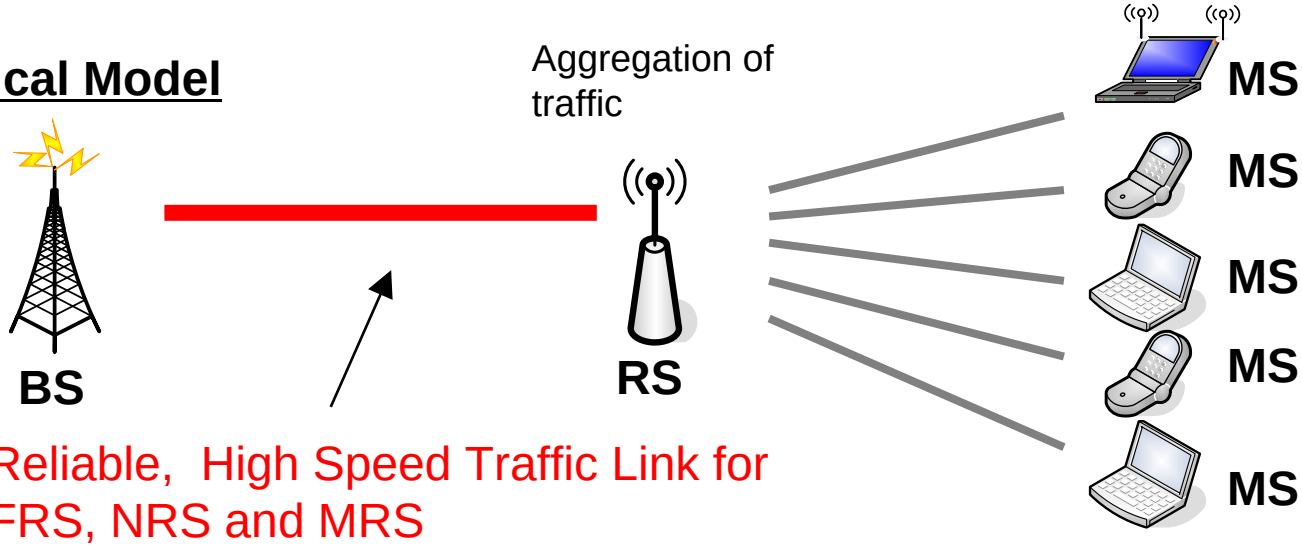




The RS link (BS-RS or RS-RS) shall provide a mechanism that enhances its reliability, efficiency and throughput while minimizing delay and delay jitter in a LOS/NLOS environment for a mobile RS

Technical Challenges/Requirements in Brief

Our Typical Model



Reliable, High Speed Traffic Link for FRS, NRS and MRS

The RS LINK

- The RS link (BS-RS or RS-RS) shall provide a mechanism that enhances its reliability, efficiency and throughput while minimizing delay and delay jitter in a LOS/NLOS environment
- The specification shall provide signaling to support MAC scheduling of data and control message transmissions on relay and access links. Scheduling may be centralized, distributed, or a hybrid.
- The RS link shall provide more efficient processing technique (to reduce power and cost) than existing technique given that the throughput pipe of the RS link would be larger
- The aggregation of traffic is supported in the RS for higher efficiency
- RS support ARQ and HARQ of MSs and SSs (stationary stations)
- MRS handover shall be supported and MRS shall be able to initiate handover for itself

Technical Requirements (1)

- ***Architectural Requirements***
  - ✓ The 802.16 specification shall support different types of RS based on intended use.
    - It shall support fixed, nomadic and mobile variants of RS.
    - It shall support extending coverage and increasing throughput variants of RS.
    - It shall support client and infrastructure RS. Where, the client RS can be owned and placed by a consumer, and the infrastructure RS can be owned by an operator.
  - ✓ RS shall serve both the mobile and stationary users.
  - ✓ The specification shall support the hop count greater than or equal to 2. The hop count shall be limited only when a specific performance requirement is necessary.

- ***Functional Requirements***
  - ✓ The specifications shall enable relay station MAC PDU and SDU configuration and processing as specified in 802.16-2004/802.16e-2005.
  - ✓ The specification shall provide signaling to support MAC scheduling of data and control message transmissions on relay and access links. Scheduling may be centralized, distributed, or a hybrid.
  - ✓ RS shall perform better than existing techniques, e.g. MIMO, and AMC, for increasing throughput, limited throughput variation for a given PHY modulation index and packet size, limited added latency and timing jitter.
  - ✓ The RS link (BS-RS or RS-RS) shall provide a mechanism that enhances its reliability, efficiency and throughput while minimizing delay and delay jitter in a LOS/NLOS environment
  - ✓ The RS link shall provide more efficient processing technique (to reduce power and cost) than existing technique given that the throughput pipe of the RS link would be larger.
  - ✓ The RS link shall operate in NLOS and LOS environment.
  - ✓ RS shall support mobile and stationary station’s ARQ and HARQ operation.

Technical Requirements (2)

- ***Mobility Requirements***
  - ✓ The 802.16 specification shall support mobility of the RS along with the associated SS/MS. For example, an RS attached to a train or bus moves along with the MS/SS in the bus.
  - ✓ The specification shall support MS seamless handover via multi-hop and shall not require modification to MS.
  - ✓ The specification shall support MRS handover and shall not require any modification to the subordinate MSs
  - ✓ The specification shall allow MRS to initiate a handover for itself
- ***Security Requirements***
  - ✓ RS shall not add any new security threats in the existing system as defined in 802.16e-2005
  - ✓ RS shall not increase in the number of security procedures for MS.