General Description of Multi-mode Operation for 802.16n

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Re:

"IEEE 802.16gman-10/0051," in response to the CFC for IEEE 802.16n AWD

Base Contribution:

N/A

Purpose:

To be discussed and adopted by 802.16n

General Description of Multi-mode Operation for 802.16n

Background

- Degraded network
  - HR-BS breakdown
  - Failure of network connectivity
- Self-healing for degraded network
  - ***Multi-mode operation***
  - MS-MS Direct communication
  - Standalone network
  - Enhanced relay functions
  - Etc.

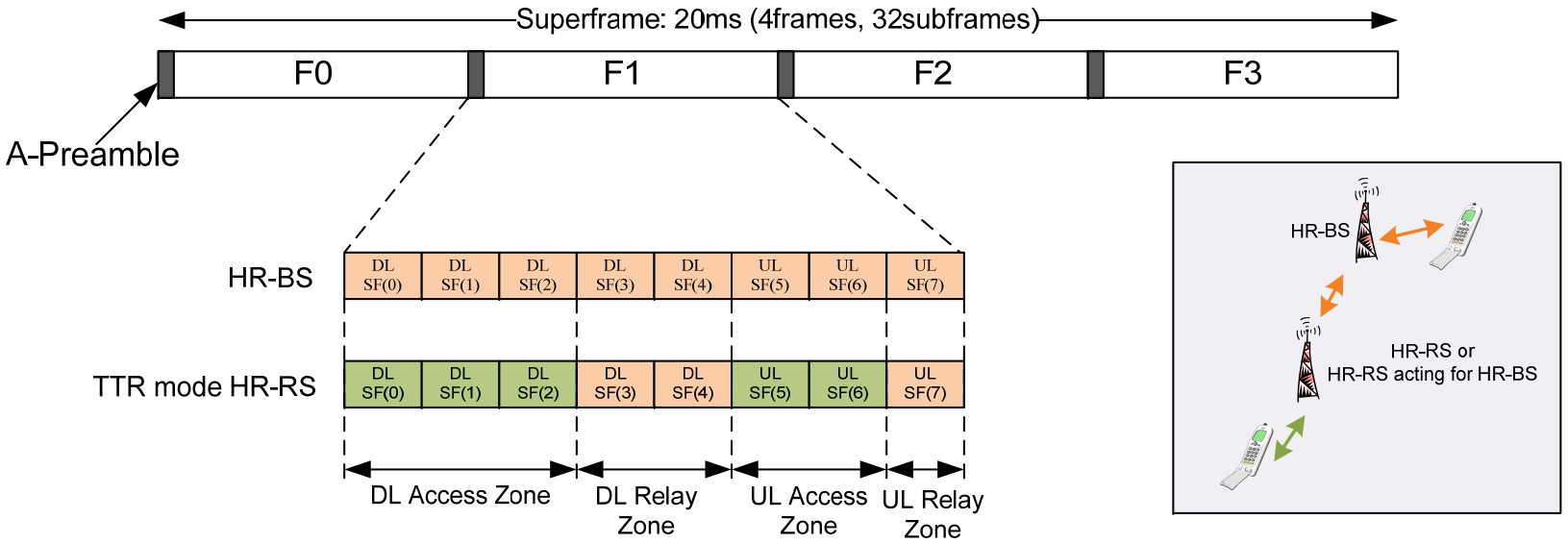
Operation Scenarios of Multi-mode station

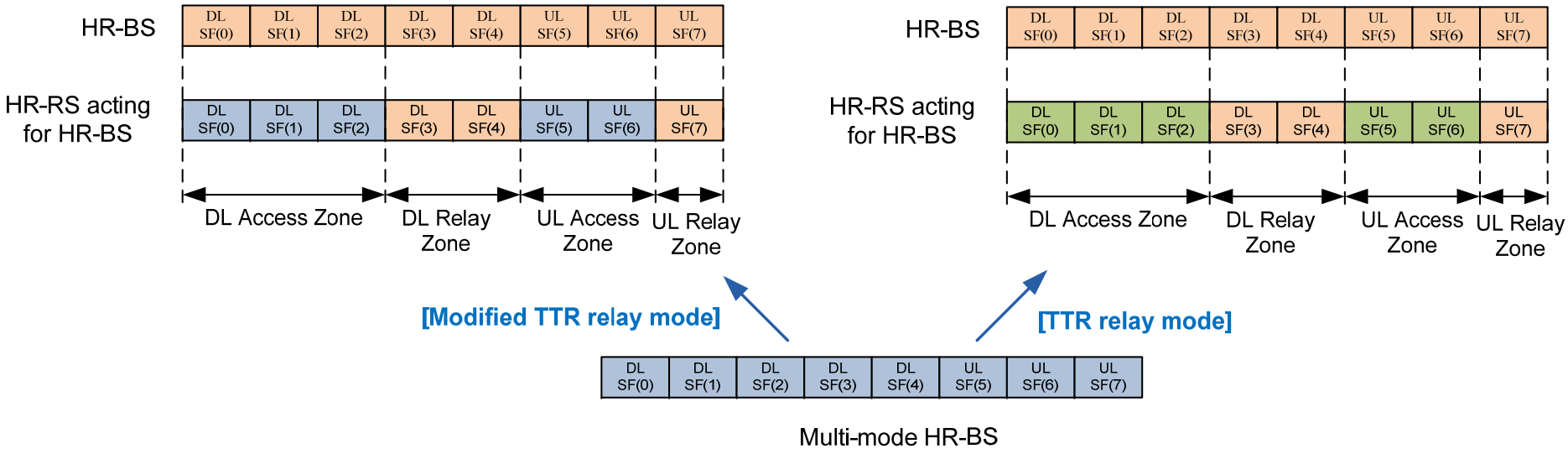
- Multi-mode HR-BS
  - RS mode
    - Breakdown in wired backbone connectivity
- Multi-mode HR-MS
  - RS mode
    - Breakdown of BS; neighbor BSs
    - BS coverage/capacity extension for disaster relief
  - BS mode
    - Breakdown of BS; in the absence of neighbor BS
    - Out of coverage
    - Temporary network construction for some PPDR mission

Relay function for HR-BS (1)

- RS operation mode
  - ***STR relay mode***
    - No change of SA-preamble & permutation → depending on BS capability & frequency resource
  - ***TTR relay mode***
    - new SA-preamble, new channel permutation in access/relay zone
      → cell reconfiguration → handover
  - ***Modified TTR relay mode***
    - No change of SA-preamble, no change of permutation in access zone
      → cell reconfiguration in relay zone only. → modified SFH

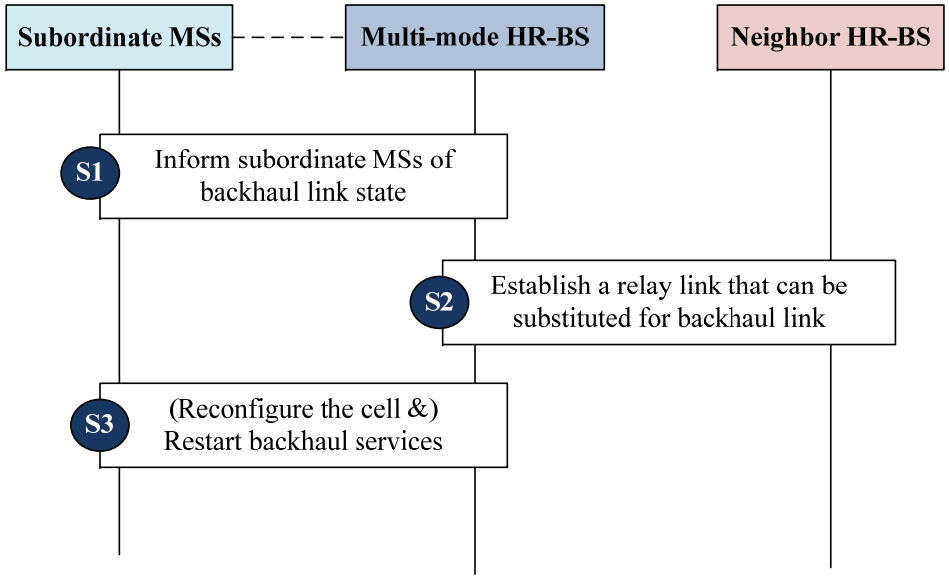
Relay function for HR-BS (2)





Relay function for HR-BS (3)

- Procedures for RS mode change
  - Step 1: Inform subordinate MSs that backhaul services are unavailable.
  - Step 2: Establish a relay link with a neighbor HR-BS.
  - Step 3: Reconfigure the physical frame and perform the handover between the RS mode HR-BS and subordinate MSs (if necessary) & restart backhaul services and inform them it.

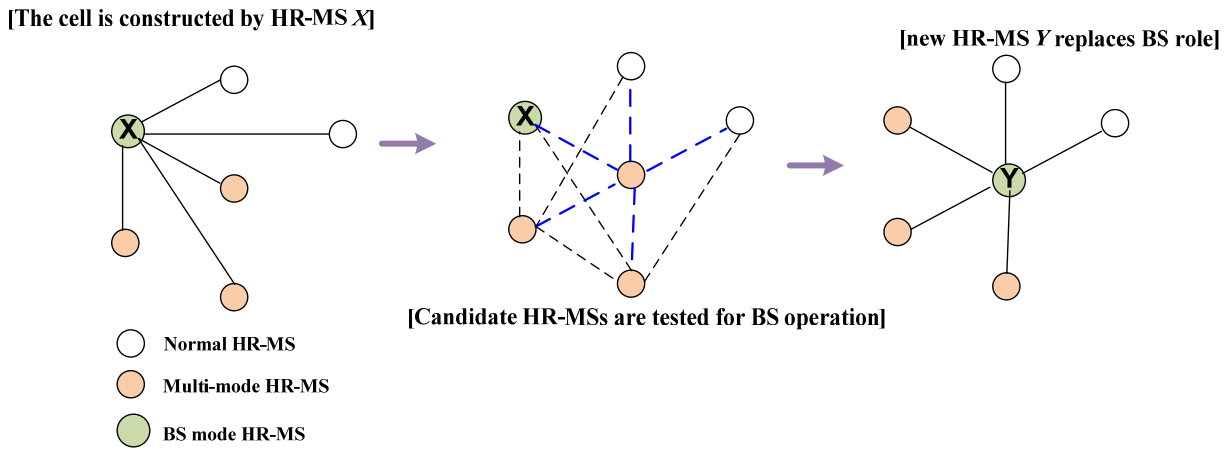


Relay function for HR-MS

- Which multi-mode HR-MS can be best for RS mode operation
  - Recognizing the necessary of relay station (ex., detecting the failure of neighbor BS)
  - HR-MS scanning
  - Testing RS mode operation of a candidate HR-MS
    - Within the RS mode HR-MS coverage, whether the RS mode HR-MS discover a HR-MS which is not connected to network or not.
- Procedures for RS mode change
  - BS-initiation
  - MS-initiation
- Data sink & source in RS mode HR-MS
  - Need to distinguish between its data and subordinate MS's data

Base station function for HR-MS

- Cell features
  - Broadband
  - same frame structure as normal HR-BS
  - Low TX power as compared with normal HR-BS
  - Small cell size
  - Restricted services (emergency call, group call, mission-critical service, etc.)
- Cell construction & dynamic BS mode change



Proposed Text (1)

17.3.1 Multi-mode operation

17.3.1.1 Relay function for HR-BS

17.3.1.1.1 General description

HR-BS with multi-mode function maintains backhaul services through a relay connection with neighbor HR-BS when its backhaul communication is unavailable. The HR-BS acting as RS mode can operate in either TTR mode or STR mode. The multi-mode HR-BS can restrict some backhaul services by the capacity of relay link.

The procedures for RS mode change are consist of three steps:

a) inform subordinate MSs that backhaul services are unavailable

b) establish a relay link with a neighbor HR-BS

c) reconfigure the physical frame and perform the handover (if necessary), and resume backhaul services and inform subordinate MSs it.

17.3.1.1.2 Relay mode control procedures

[TBD]

17.3.1.1.3 Handover and service restart

[TBD]

Proposed Text (2)

17.3.1.2 Relay function for HR-MS

17.3.1.2.1 General description

In HR-Network, HR-MS with multi-mode function can perform additional RS function for degraded network temporarily. Mode change for relaying is initiated by HR-BS or HR-MS. HR-MS operates in either TTR mode or STR mode and its relay mode is determined by the negotiation between HR-MS and HR-BS.

17.3.1.2.2 Relay mode control procedures

[TBD]

17.3.1.3 Base station function for HR-MS

17.3.1.3.1 General description

HR-MS with multi-mode function can construct a standalone network acting as BS mode. The HR-MS action as BS has the same function (i.e., frame structure, connection management, PDU management, etc.) as HR-BS.

17.3.1.3.2 Cell construction and dynamic BS mode change

[TBD]