Recommendation on 802.16 MMR with Backward Compatibility

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Gang Shen, Wei Ni, Wei Zou, Shan Jin
Alcatel Shanghai Bell
388#, Ningqiao Road, Shanghai, P. R. C.

Voice: +86 21 58541240 8194
Fax: +86 21 50554550
E-mail: gang.a.shen@alcatel-sbell.com.cn

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Purpose:

Propose a 802.16 relay solution which follows the requirements of MMR.

Recommendation on 802.16 MMR with Backward Compatibility

Gang Shen, Wei Ni, Wei Zou, Shan Jin

Research & Innovation

Alcatel Shanghai Bell

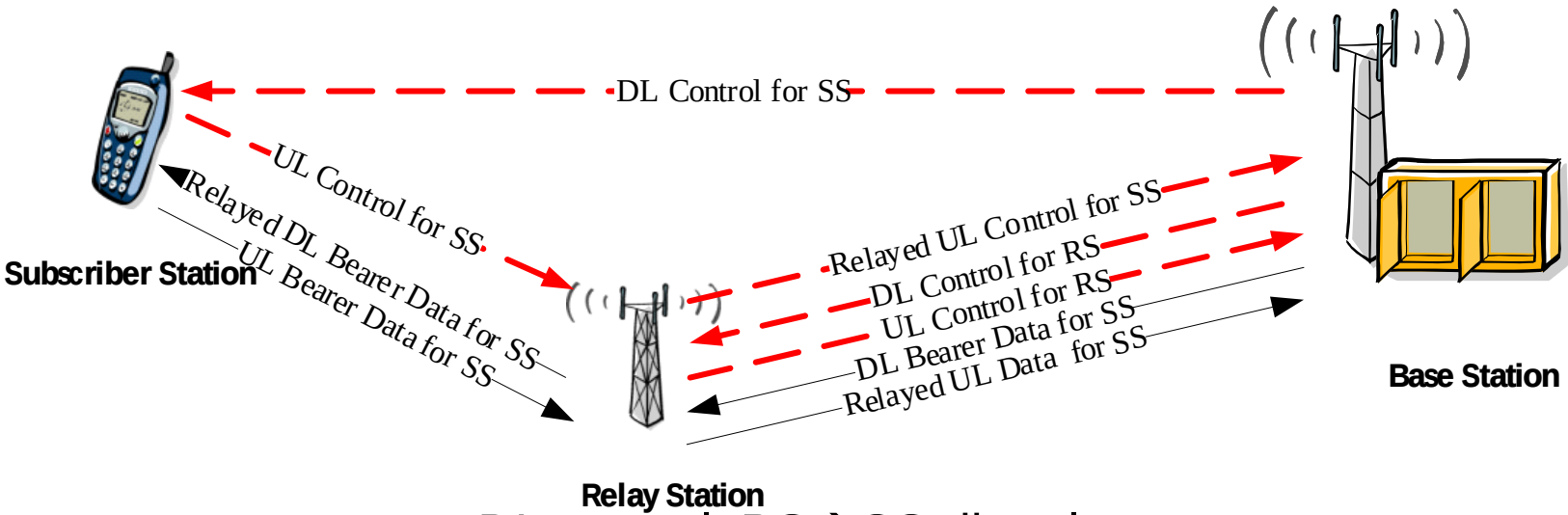
Outline

- Requirements of mobile multihop relay.
- Concepts and features of proposed relay.
- Summary

Requirements

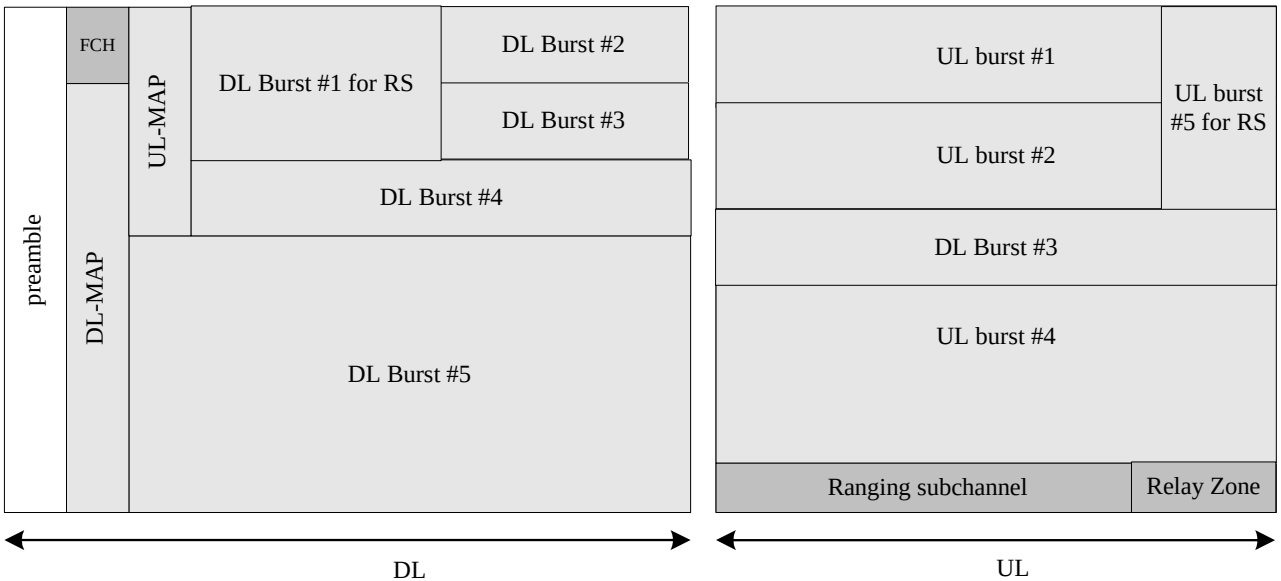
- Backward compatibility
  - No change on conventional SS, while SS relay is supported
  - Little update on BS
- No / Less additional latency after relay introduction
- Simple and cheap RS

General Ideas



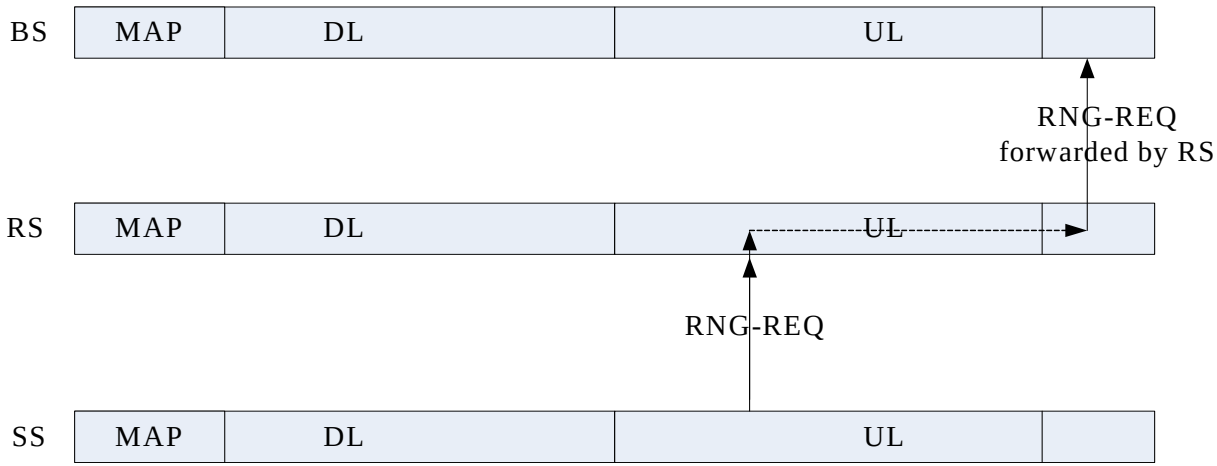
- Communication path DL control: BS→SS directly
  - UL control: SS→RS→BS
  - DL bearer data: BS→RS→SS
  - UL bearer data: SS→RS→BS
- No changes on SS, while relay is supported for conventional SS
- Little update on BS
  - BS needs to know the existing of RS
  - BS allocates resource for RS and SS

Frame structure



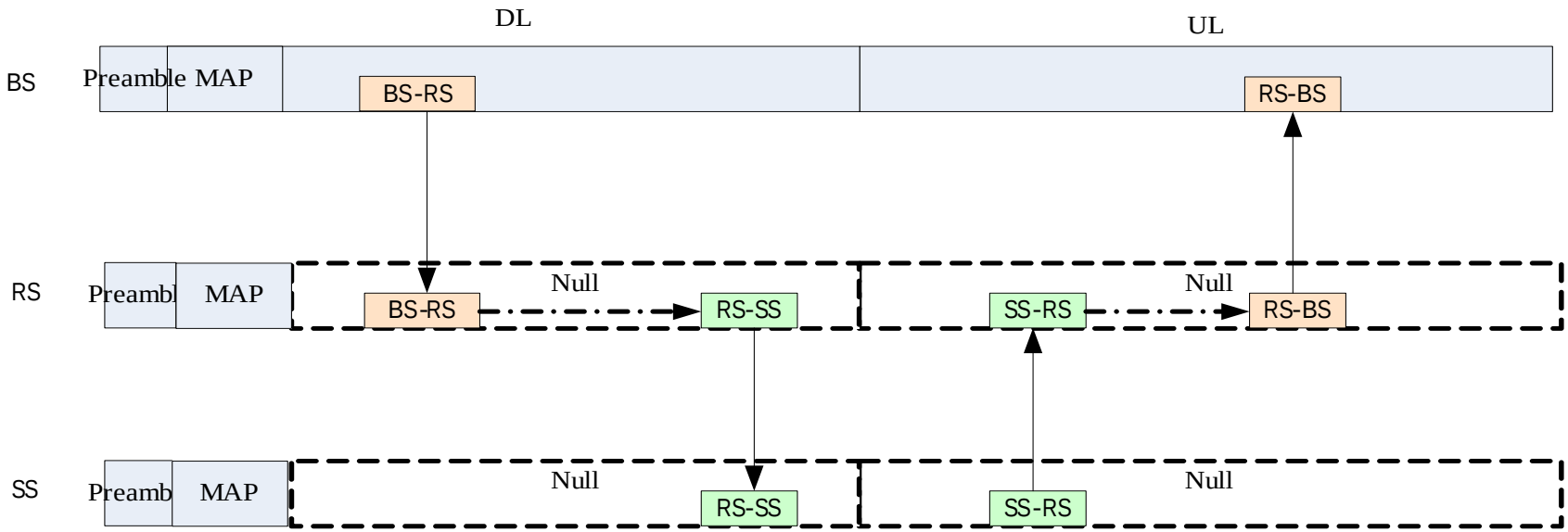
- A dedicated relay zone is reserved
  - At (or near) the end of UL frames.
  - For UL control information relaying, e.g. ranging request relay
- The ranging sub-channel
  - Located preceding the relay zone.
- Ranging request received by RS can be retransmitted within the same frame
- No additional delays in ranging request relay or other UL control signal relaying

Ranging Request Relay



- Ranging request relay
  - Forwarded to BS in the dedicated relay zone
  - RS informs BS the measurement results of power level and timing
- RNG-RSP
  - Reply to SS a RNG-RSP message
  - The power level assignment and timing offset contained in the RNG-RSP is adjusted according to signal measurement in RS.

Bearer Data Transmission



- BS allocate bursts for SS and RS
  - For DL, BS sends a special data burst addressed to RS
    - Indicate which SS should be relayed.
    - Indicate DL resource allocation for RS
    - The SS burst is always after the RS burst.
  - For UL, BS allocates resources for RS and SS in UL-MAP.
    - The RS burst is always after the SS burst.
- Bearer data relay within one frame

Advantages

- Throughput enhancement
- Backward compatibility
  - There is not any update on SS. The conventional SS is supported for relaying.
- No additional latency
  - No matter for DL/UL data and control information transmission, relayed information reaches BS or SS within the same frame.
  - No additional latency after the introduction of relaying.
- Simple and cheap relay station design
  - All the control and schedule functions are still located in BS
  - RS just follows BS’s commands and scheduling

Summary

- RS is transparent to SS
- UL control information is relayed to BS
  - Dedicated relay zone reserved in the frame for UL control information relay, e.g. ranging request
- DL control information is directly transmitted to SS
- For bearer data transmission, BS allocates repeated bursts for RS and SS within one frame
  - For DL, the burst for SS is always after the one for RS.
  - For UL, the burst for RS is allocated after the one for SS.