

A MAC frame structure for IEEE 802.16j multihop relay networks

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Purpose:

Propose a MAC frame structure to be considered for Section 8.4.4 Frame Structure.

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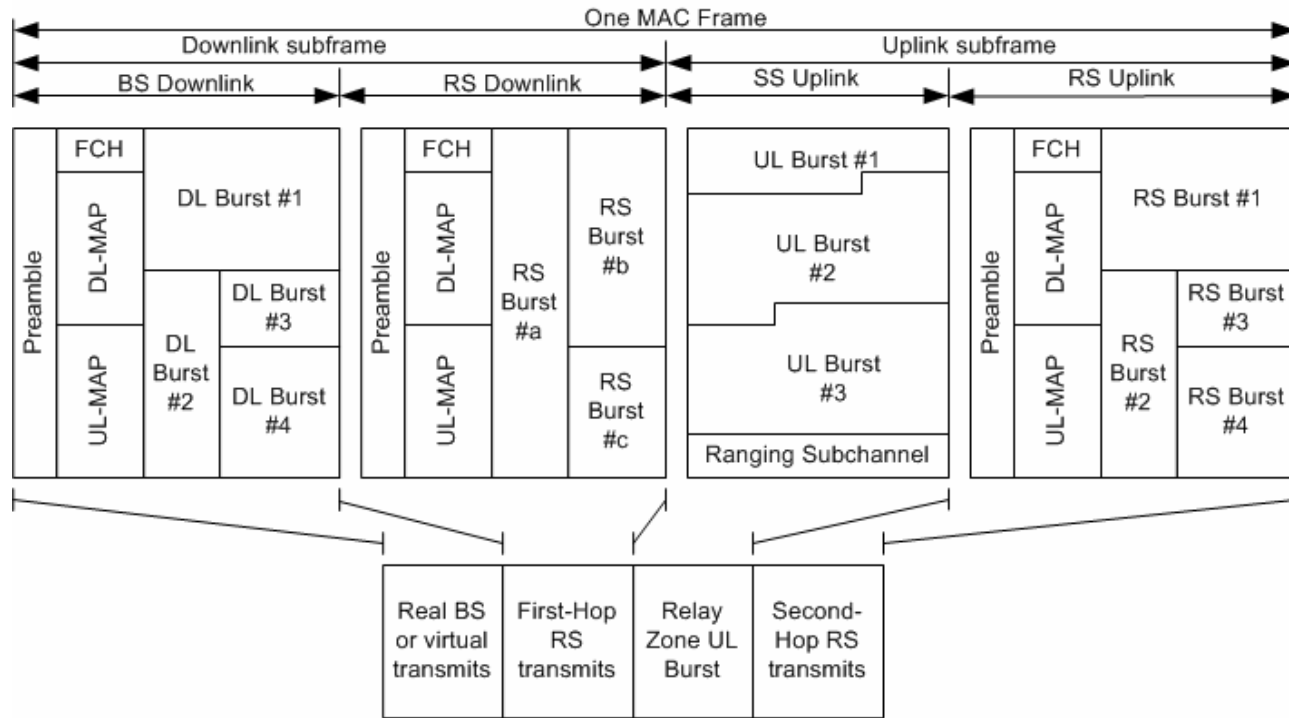
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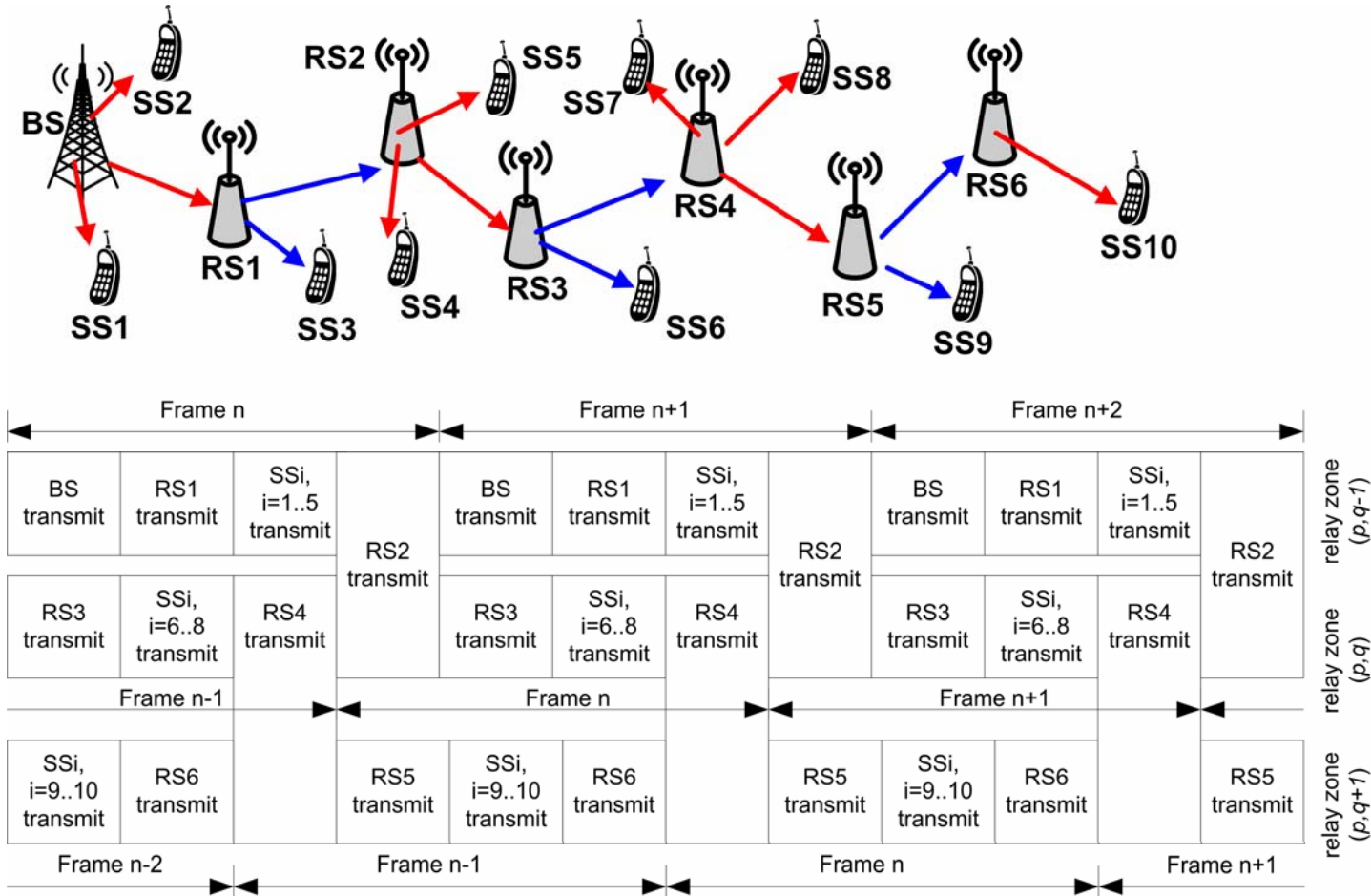
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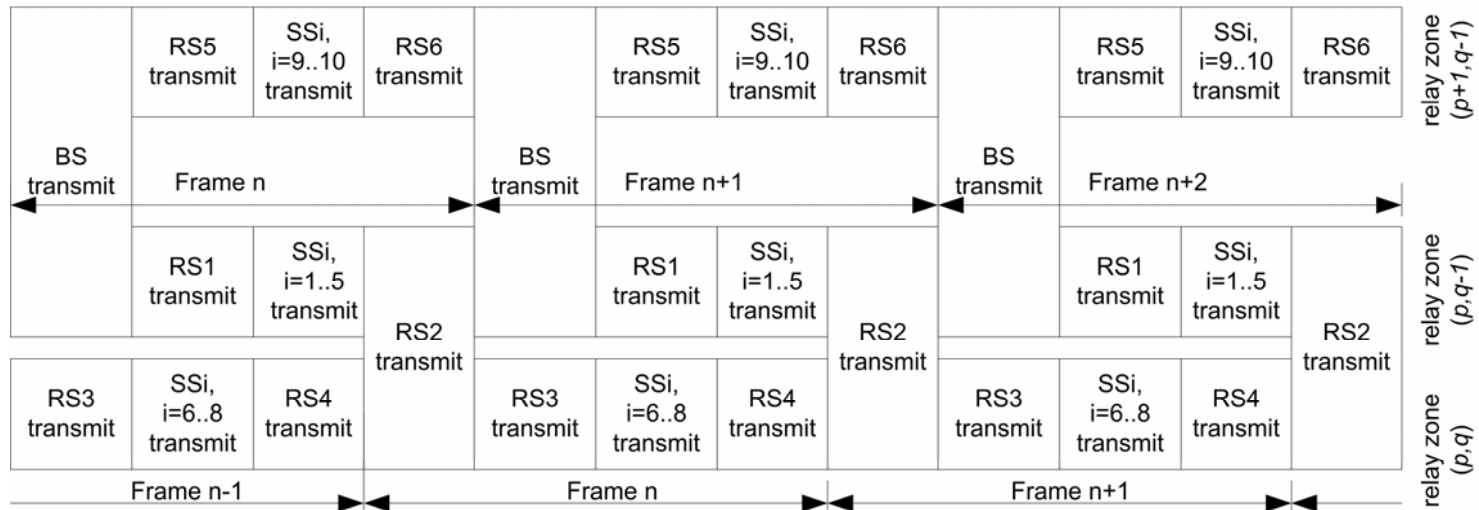
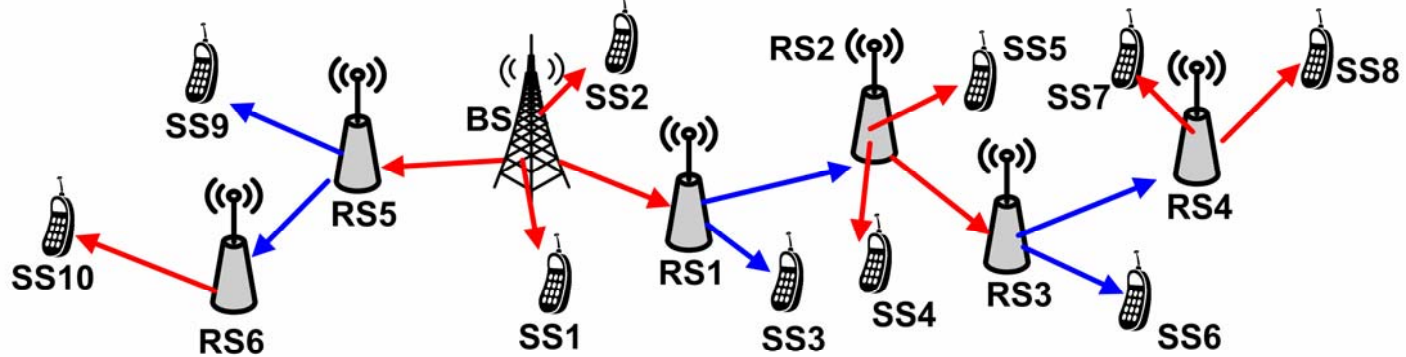
- Improve network performance by allowing spatial reuse.
- One MAC frame is divided into a downlink subframe and a uplink subframe.
- Downlink subframe is further divided into BS downlink and RS downlink.
- Uplink subframe is further divided into SS uplink and RS uplink.
- BS downlink: Real BS or virtual BS.

Single Relay Chain



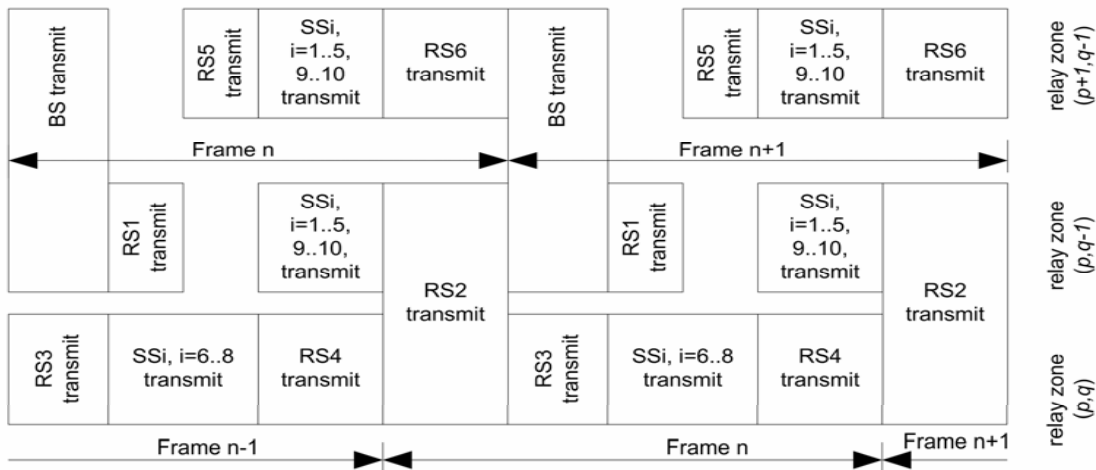
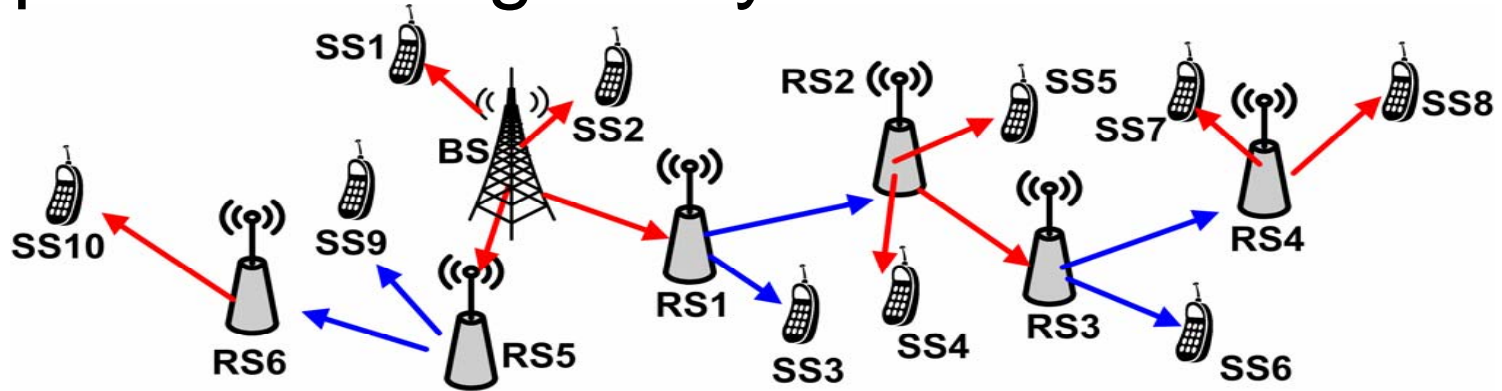
- relay zone $(p, q) = \{SS1, SS2, SS3, SS4, SS5\}$. Virtual BS = RS2.
- relay zone $(p, q+1) = \{SS6, SS7, SS8\}$. Virtual BS = RS4.

Multiple Non-Interfering Relay Chains



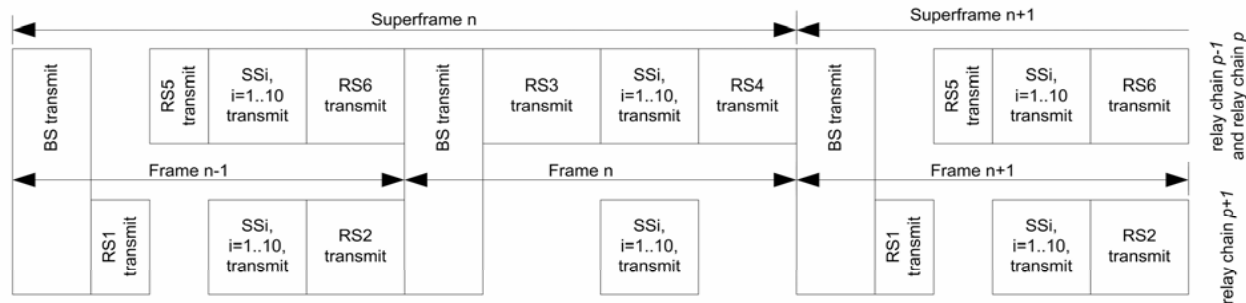
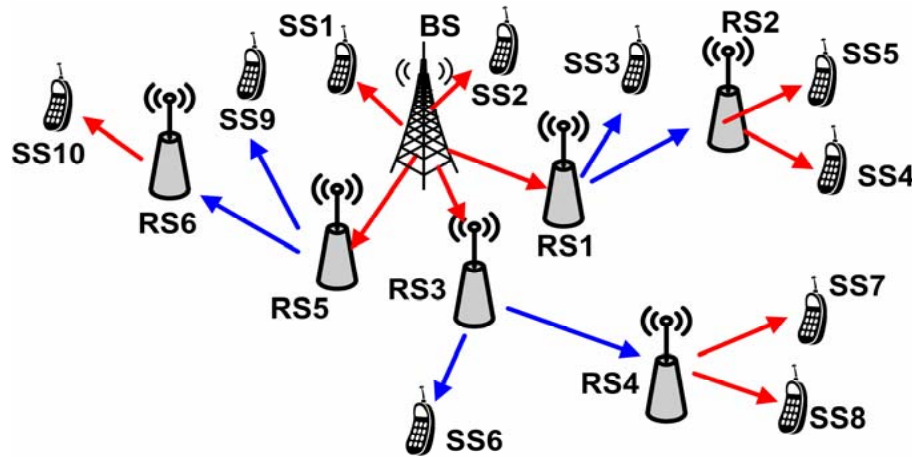
- Non-interfering RS can transmit concurrently. RS1 and RS5 are not interfering each other.

Multiple Interfering Relay Chains



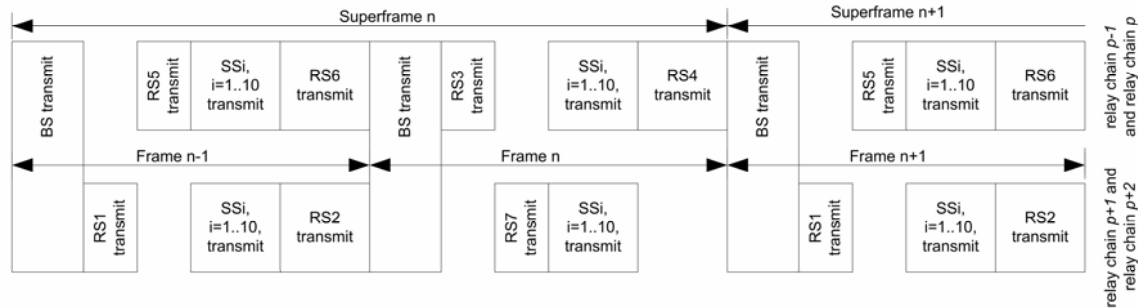
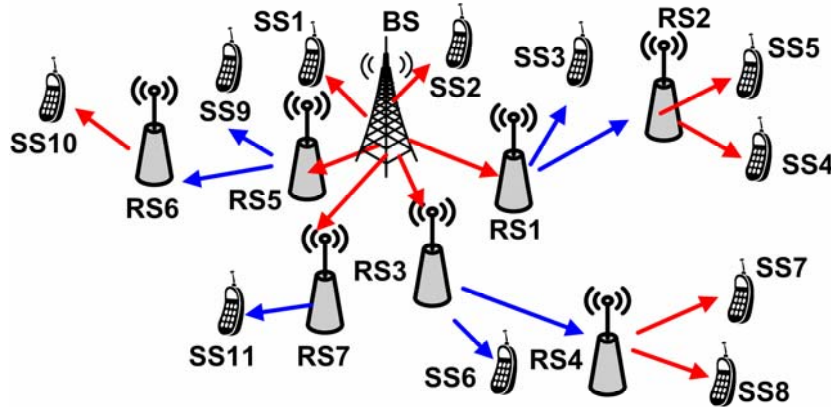
- RS1 and RS5 have overlapping coverage but not RS2 and RS6.
- The RS downlink part needs to be shared in time domain.
- The RS uplink part may need to be shared in time domain if RS2 and RS6 are interfering.

Formation of Superframe



- There may not be enough OFDMA symbols in a RS downlink and a RS uplink to accommodate all interfering relay stations.
- For a superframe that combines multiple MAC frame such that all interfering RS can be accommodated at least once in each superframe.

RS for Throughput enhancement



- For throughput enhancement, RS is required despite SS is within the directly reach of the BS.
- This is dealt with a a case of multiple interfering relay chains.
- RS7 is for throughout enhancement, and forms a chain $p+2$.