

Relay Support for Scheduling, Bandwidth Request and Allocation Mechanism

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Purpose:

. Propose Relay Support for Scheduling, Bandwidth Request and Allocation Mechanism

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Introduction

- This contribution proposes mechanisms and specification changes for
 - scheduling service
 - bandwidth request and allocation mechanism
- As we amend 802.16 spec for relay, it is needed to specify the above features considering relays.
- Scheduling service is proposed for both control model:
Centralized and Distributed
- Bandwidth request and allocation is proposed for the distributed model
- Another contribution covers the BW request and allocation for the centralized model

Scheduling Services

Centralized Scheduling Services

- The centralized scheduling is suggested for the RSs with limited capability.
- The type of scheduling services (i.e., UGS, rtPS, ertPS, nrtPS, BE) for MMR remains the same.
- The scheduled transmission for MSs and RSs shall be defined by the MMR-BS.
- MMR-BS uses MAP to specify and inform resource allocation to each MS or RS.
- RS just follows the instruction based on the MAP information and relays traffic accordingly.

Distributed Scheduling Services

- With distributed scheduling services, MMR-BS only schedules the traffic transmitted on its direct link.
- Each RS generates its own MAP and schedules the traffic based on the QoS requirement of the service flow.
- RSs shall not change the CID and SFID originally assigned by the MMR-BS to the flow.
 - Keeps RS simple by keeping connection and CS interaction at MMR-BS
- The scheduling algorithm is out of the scope of the specification. MMR-BS/RS may schedule the traffic considering
 - Capacity, load condition, potential resources to be used for retransmission for all the remaining stations on the relay path

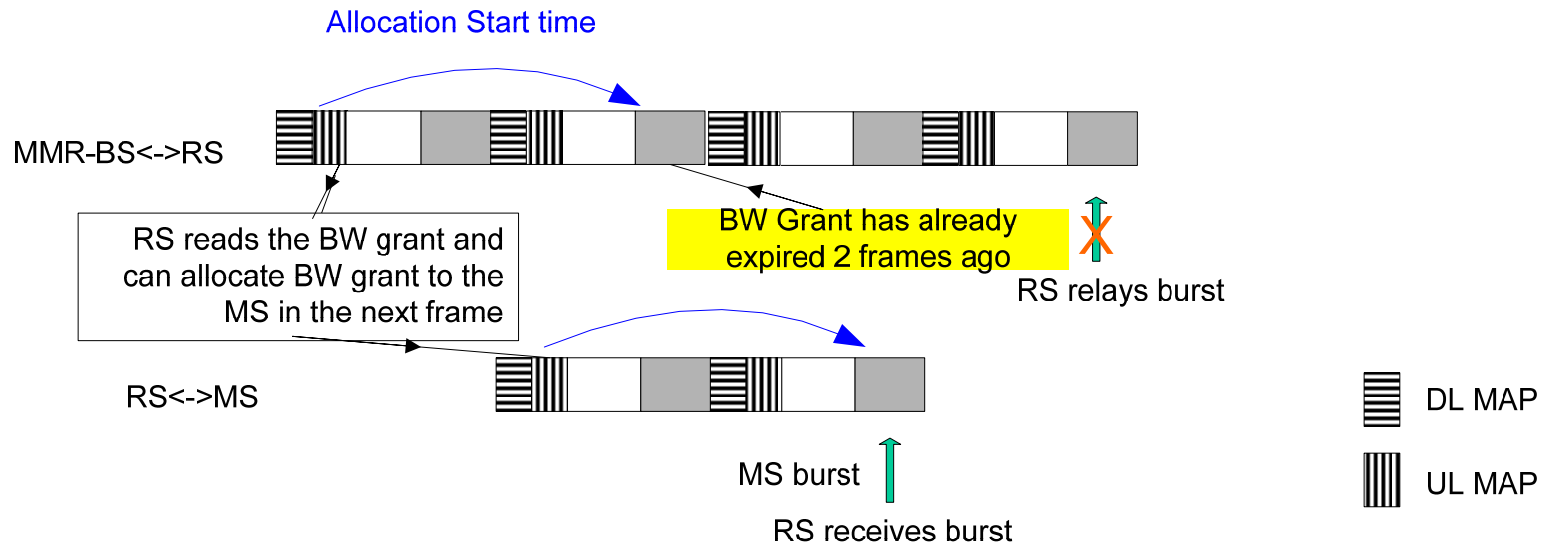
Bandwidth Request/Allocation

Bandwidth Request for Distributed Scheduling

- Bandwidth Request sent from MS to the MMR-BS via one or more RS on the relay path
- RS doesn't process the request and simply relays it to the MMR-BS
- The request may come as a stand-alone bandwidth request header or a PiggyBack Request or a contention based CDMA bandwidth request

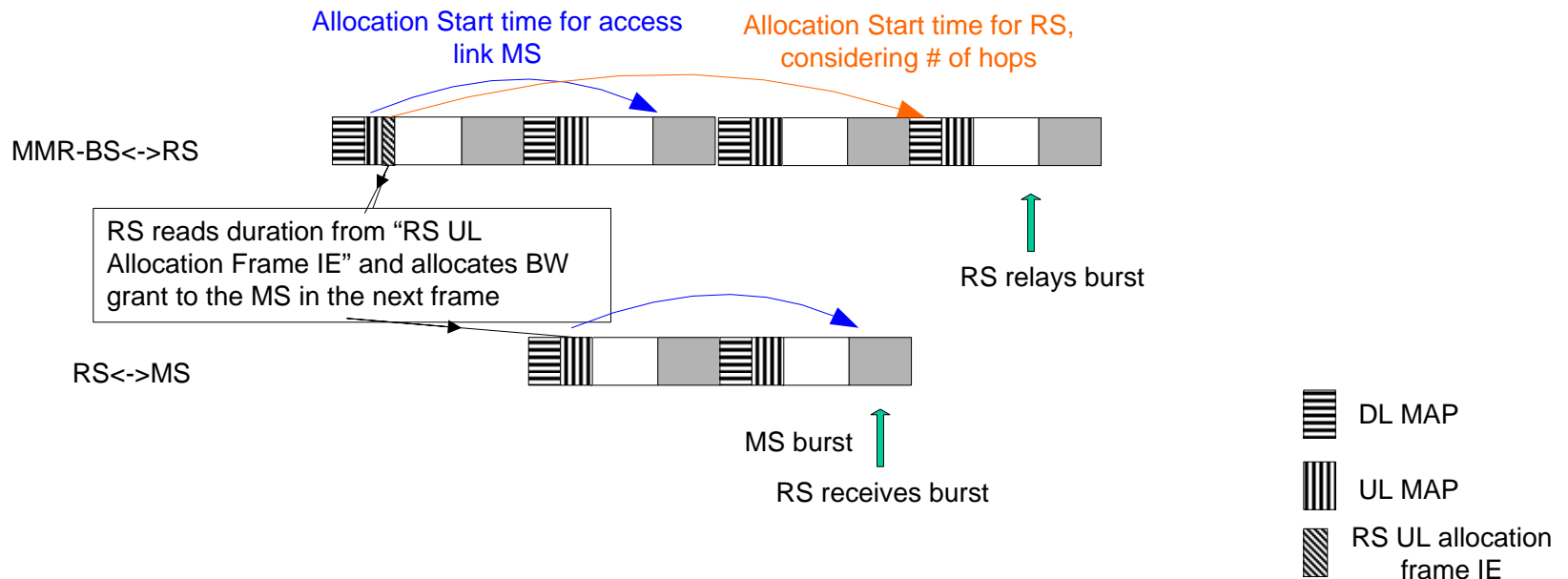
Bandwidth Grant Problem in Distributed Scheduling

- Bandwidth grant is issued on hop-by-hop basis, i.e., MMR-BS or a RS issues the bandwidth grant (specified in UL-MAP) for its direct downlink neighbor (e.g., RS or MS)
- The bandwidth grant issued by a RS is triggered by the reception of a bandwidth grant from its direct uplink neighbor. There is an inherent delay caused by each hop.
- When the RS is ready for relaying a received UL burst, the UL allocation from MMR-BS has already expired.



Solution: Synchronization of Bandwidth Grant

- RS UL allocation frame IE is proposed for solving synchronization problem.
- Frame offset field indicates the frame in the future where RS has the bandwidth grant
- Duration field indicates the size of the grant, so RS can schedule bandwidth grant on its access/relay link.



Polling in Distributed Scheduling

- Similar to the bandwidth grant, polling is issued on the hop-by-hop basis
- Since the poll is actually bandwidth allocated in the UL-MAP, the bandwidth grant synchronization issue as well as its solution apply to polling as well.
- RS allocation frame IE from MMR-BS acts as a trigger for the RS to issue polling on its access/relay link.

Conclusion

- The contribution provides text for supporting the following features for MS in Relay
 - Scheduling Services - Section 6.3.5 (centralized and distributed)
 - Bandwidth Allocation and Request Mechanism - Section 6.3.6 (distributed)
- Scheduling Services
 - Solution keeps RS simple: Proposed to keep CID and SFID management in MMR-BS
- Bandwidth Allocation and Request Mechanism
 - Proposed a simple solution for the bandwidth grant synchronization problem due to multi-hops
 - Minimal changes: Only one UL MAP IE is defined for achieving synchronization.
 - Flexible Solution: Bandwidth grant or polling can be assigned on the basis of RS basic CID or MS/SS basic CID. The former case provides flexibility to RS for distributing bandwidth grants to its direct downlink stations.
 - No changes on the air interface.