

# Pipeline HARQ in Multi-hop Relay System

## IEEE 802.16 Presentation Submission Template (Rev. 8.3)

Document Number:

IEEE S802.16j-07/185r2

Date Submitted: 2007-03-15

Source:

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Venue:

IEEE 802.16 Session #48, Orlando, USA

Base Document:

IEEE C802.16j-06/026r2 and URL <[http://ieee802.org/16/.../C80216j-06\\_026r2.pdf](http://ieee802.org/16/.../C80216j-06_026r2.pdf)>

Purpose:

Propose the text regarding pipeline HARQ in a multi-hop relay system.

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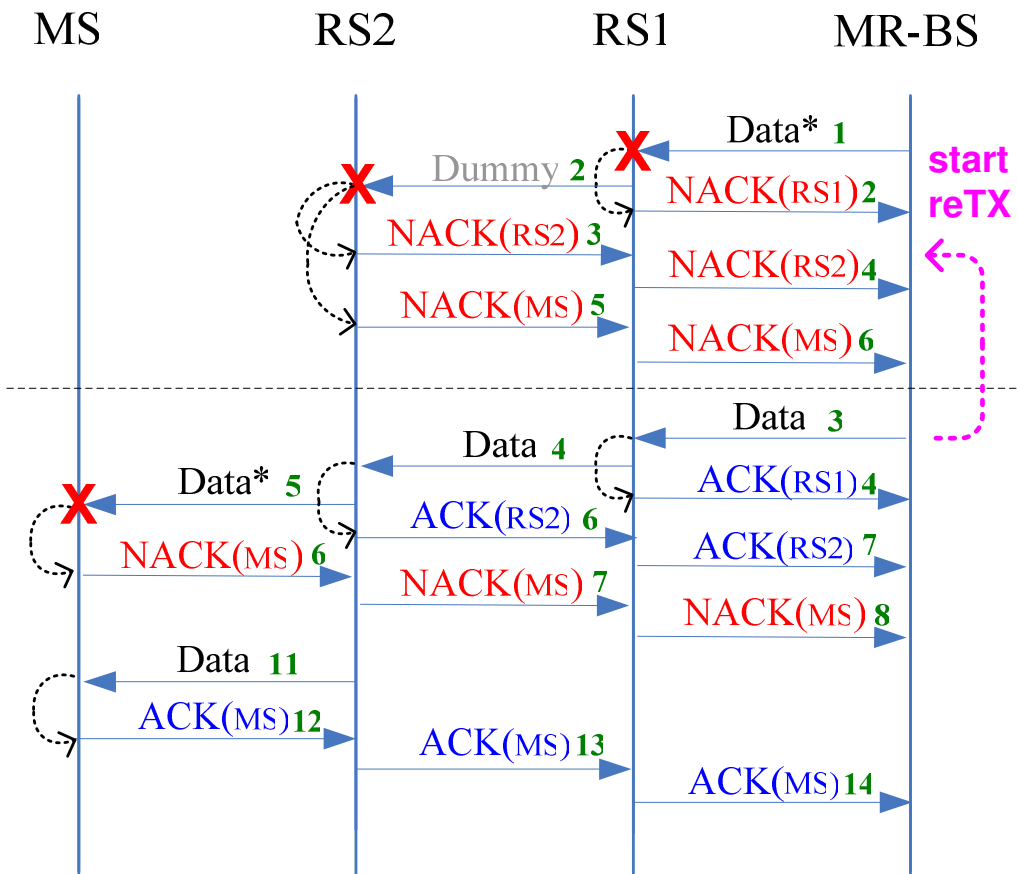
# ***Introduction***

- **This contribution proposes a procedure for handling retransmission of HARQ failure attempts in a relay system**

# ***Pipeline HARQ***

- From system-wise viewpoint, unnecessary retransmissions caused from ACK lost will degrade system performance
  - Per UL/DL HARQ channel, MR-BS should allocate one dedicated ACK channel for each RS on relay path
  - Both **centralized** and **distributed MAP allocation schemes** could be adopted in multi-hop relay system with pipeline HARQ

# DL Pipeline HARQ



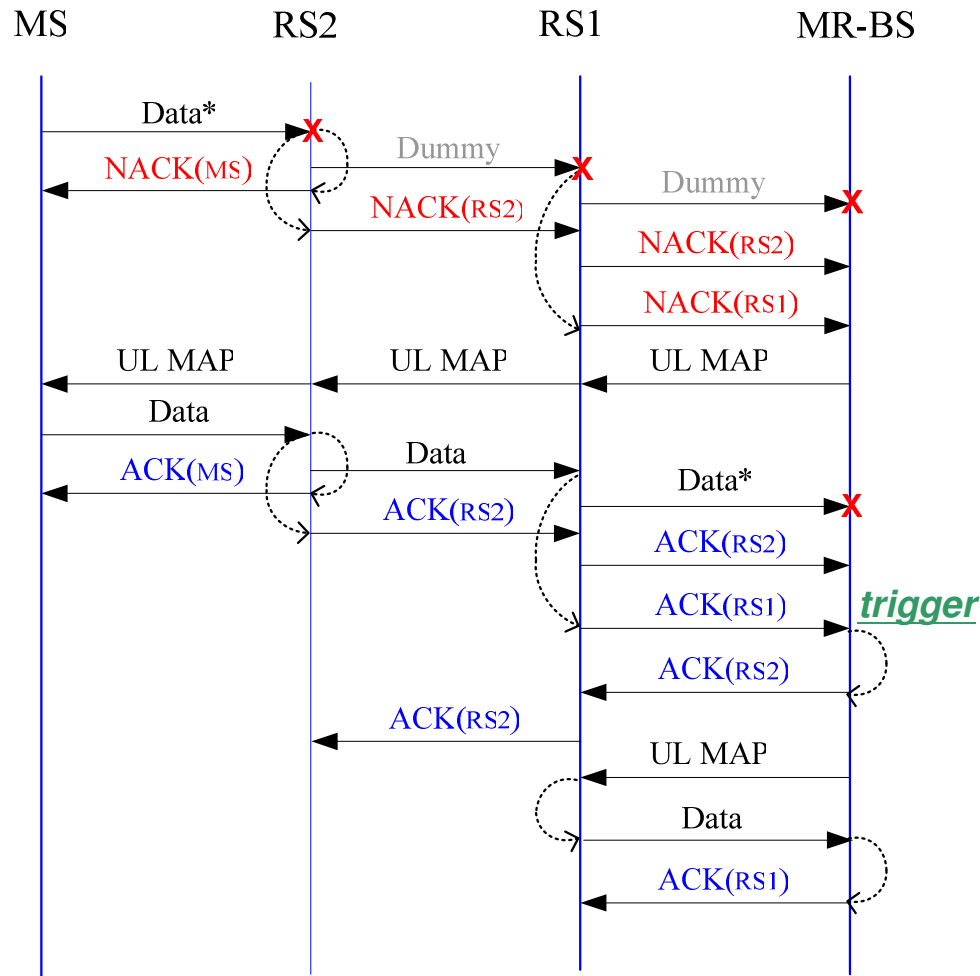
1. ACK/NACK shall be generated by RS/MS.
2. ACK/NACK shall be forwarded to MR-BS by RS.
3. RS does not forward erroneous HARQ packet, instead it sends predefined dummy information on relay links.
4. If access RS does not have correct packet yet, it
  1. generates NACK on behalf of MS
  2. replaces MS CID in DL HARQ sub-burst IE as RS CID
5. Failure is detected at the 2nd frame. BS can early start retransmissions at the 3<sup>rd</sup> frame.
6. Retransmission occurs on effected links only.

Data\* : indicate data packet is failed during transmission

Data : indicate data packet is successfully transmitted

Dummy : indicate RS sending the dummy information on HARQ sub-burst

# UL Pipeline HARQ



There are **two kinds** of ACK/NACK per HARQ channel : **DL ACK/NACK** and **UL ACK/NACK**

1. **UL ACK/NACK** shall be generated by **RS** and forwarded to BS.
  2. **DL ACK/NACK** destining to **MS** shall be generated by **access RS**.
  3. **DL ACK** destining to **RS** shall be generated by BS.
  4. **DL NACK** destining to **RS** may be generated by BS.
- ⇒ **UL ACK** from intermediate RS **triggers** BS to send **DL ACK** to the successor of that RS

Data\* : indicate data packet is failed during transmission

Data : indicate data packet is successfully transmitted

Dummy : indicate RS sending the padding bits on HARQ sub-burst

# ***Summary***

- **This contribution proposes that**
  - 1) **Per HARQ channel, MR-BS should allocate one ACK channel to every RS on the path**
  - 2) **RS should send separate ACK/NACK to MR-BS to assist MR-BS to precisely find out those effected links required for retransmissions**
  
- **To insert new sub-clause 6.3.17.5 into**
  - **6.3.17.5 RS supporting pipeline HARQ in centralized scheduling**