Dynamic Bandwidth Reservation at Audio Video Bridging

Paul Hongkyu Jeong
SAMSUNG Electronics

IEEE 802.1 AVB TG
2007.07.17

paul.jeong@samsung.com

Needs of Dynamic Bandwidth Reservation

❑ DLNAv2 (Use case 2.4 QoS clusters)

| Use Case #	Title	Description
QoS Cluster 3 (4 scenarios)	Availability of QoS Information	The network resource availability is constantly changing, especially with the existence of dynamic wireless segments. A number of use cases that aim to provide predictable user experience require information regarding network state to make consistent and meaningful decisions. This cluster describes scenarios where **traffic streams adapt to changing network conditions or require user intervention when there is a degradation in network resource availability**
Title	**Summarized User Experience**	
End-user control over stream admission and quality 2	John is attending meetings. So he decided to record the SuperBowl on the PVR. His daughter Jill is looking at a soap in her bedroom. Then mother Sue wants to watch CSI in the digital living on a high definition tv. The system replies with a message: "Your network currently cannot maintain playback of this program at this quality since a recording is scheduled. Please choose: (1) Continue anyways, inform me again when the resource conflict occurs (2) Playback of CSI in normal TV resolution instead, (3) Cancel playback of CSI". Sue decides for option (1). 10 minutes later the SuperBowl starts and the PVR wants to record the game. Sue gets a message from the system: "Your network currently cannot continue playback of this program at this quality as a recording is started. Please choose: (1) Reduce quality of CSI to normal TV resolution (2) Cancel playback of CSI (3) Stop the recording. **Sue decides for (1) to reduce her quality to ensure that the recording has sufficient quality**	

(Ref. DLNAv2_Usage_Scenario_priority_voting_summaryr2 – techtf analysis.xls at www.dlna.org**)**

❑ UPnP QoS 3
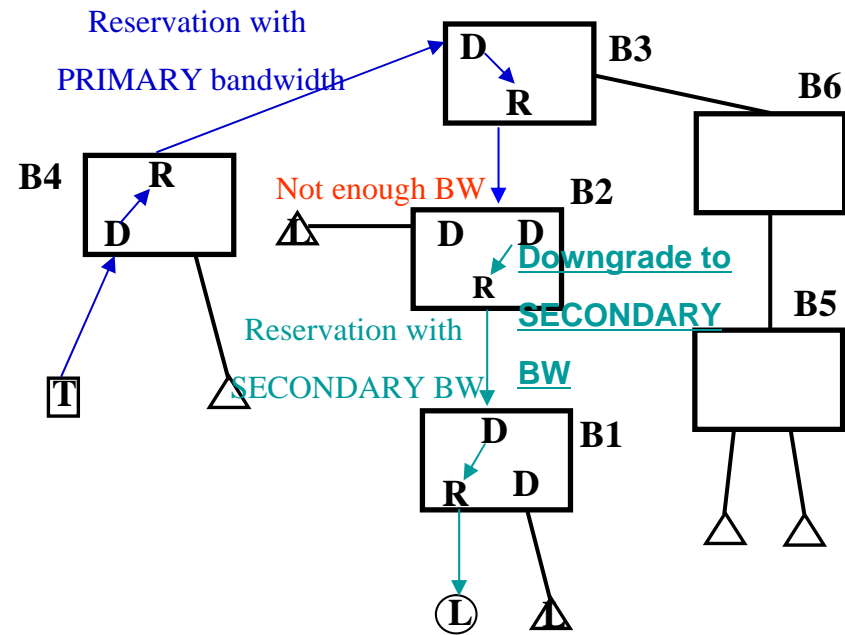
- PeakDataRate
- MeanDateRate

Description of Reference Model 1

Static Bandwidth Reservation 1
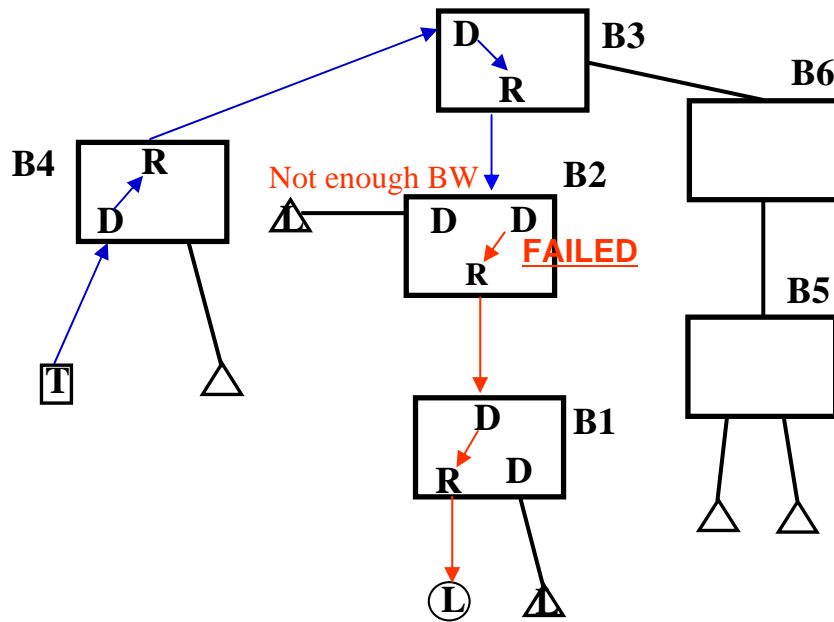
RESV with a "SUCCEEDED" SI

RESV with a "FAILED" SI

Dynamic Bandwidth Reservation 1

RESV with a "SUCEEDED" SI

RESV with a "SECONDARY" SI

❑ **Purpose: Increase possibility to provide service for users**

❑ **Assumption: Talker knows BW requirements of listeners through high layer such as UPnP**

Work of .1Qat for Reference Model 1

❑ Reservation field addition

- TSPEC: Double bandwidth requirements (PRIMARY, SECONDARY)
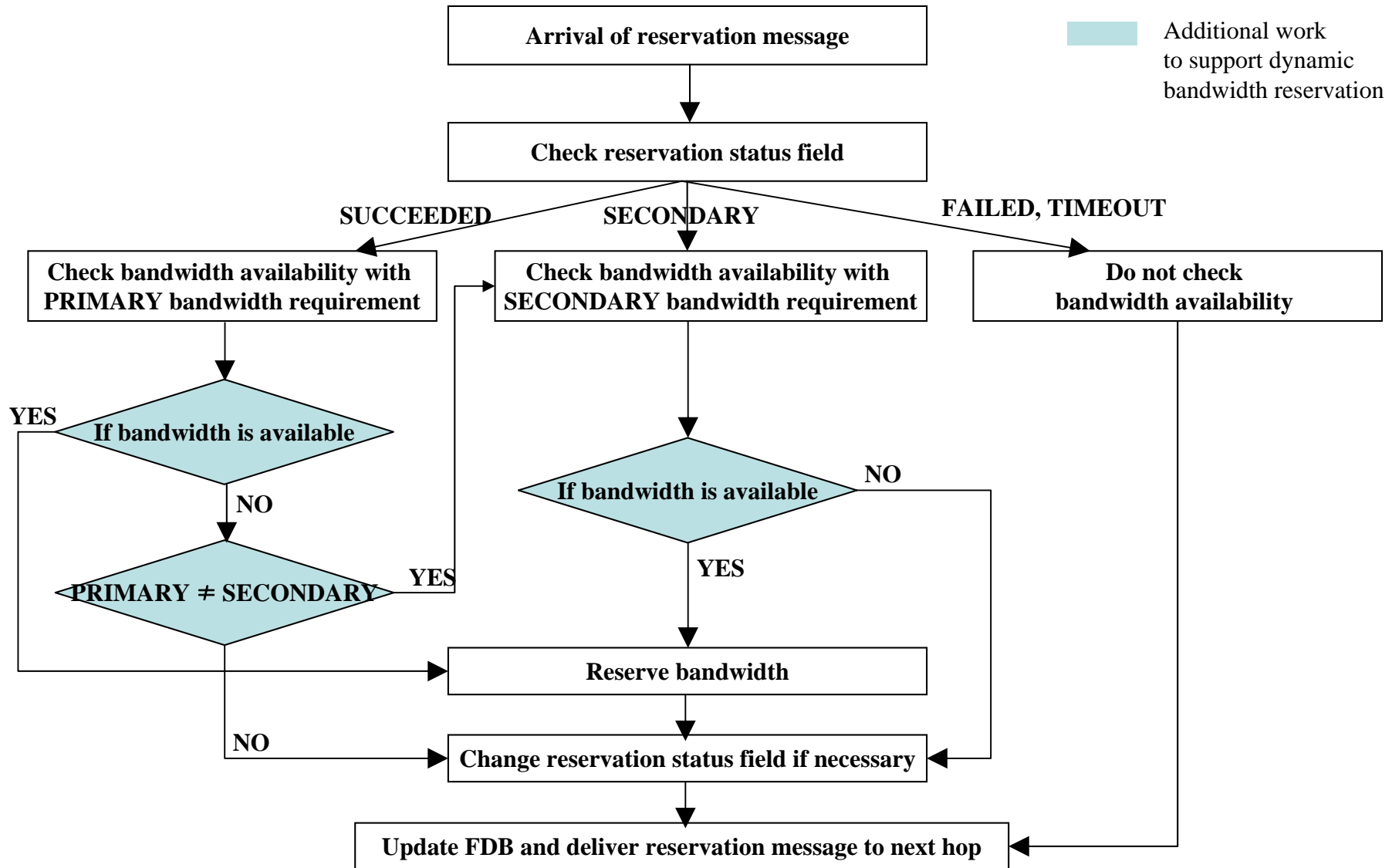- "SECONDARY" reservation status field

	Octet
Stream Identifier	1-6
TSPEC (PRIMARY, SECONDARY)	7-14
Talker MAC	15-20
Reservation Status (including SECONDARY)	x-x

Figure 1. Suggesting Reservation Message Structure

❑ ResultCode

- SUCCEEDED, FAILED, TIMEOUT, and **SECONDARY**

Work of .1Qav for Reference Model 1

Arrival of reservation message

Additional work to support dynamic bandwidth reservation

Check reservation status field

SUCCEEDED — Check bandwidth availability with PRIMARY bandwidth requirement

SECONDARY — Check bandwidth availability with SECONDARY bandwidth requirement

FAILED, TIMEOUT — Do not check bandwidth availability

If bandwidth is available — YES / NO

PRIMARY ≠ SECONDARY — YES / NO

If bandwidth is available — YES / NO

Reserve bandwidth

Change reservation status field if necessary

Update FDB and deliver reservation message to next hop

Cf. Having identical value for PRIMARY and SECONDARY means reservation request of static bandwidth

SAMSUNG Electronics　　　　　**IEEE 802.1 AVB TG July 2007**

Description of Reference Model 1 (cont.)

❑ **Use cases to manipulate suggested fields**

● Dynamic BW request: request BW with different PRIMARY and SECONDARY values

● Static BW request: request BW with the same PRIMARY and SECONDARY value

❑ **Applications**

● Applicable to unicast scenarios

● Partially applicable to multicast scenario

◆ When only one listener is receiving multicast stream and the listener agree to degrade quality for servicing new streams

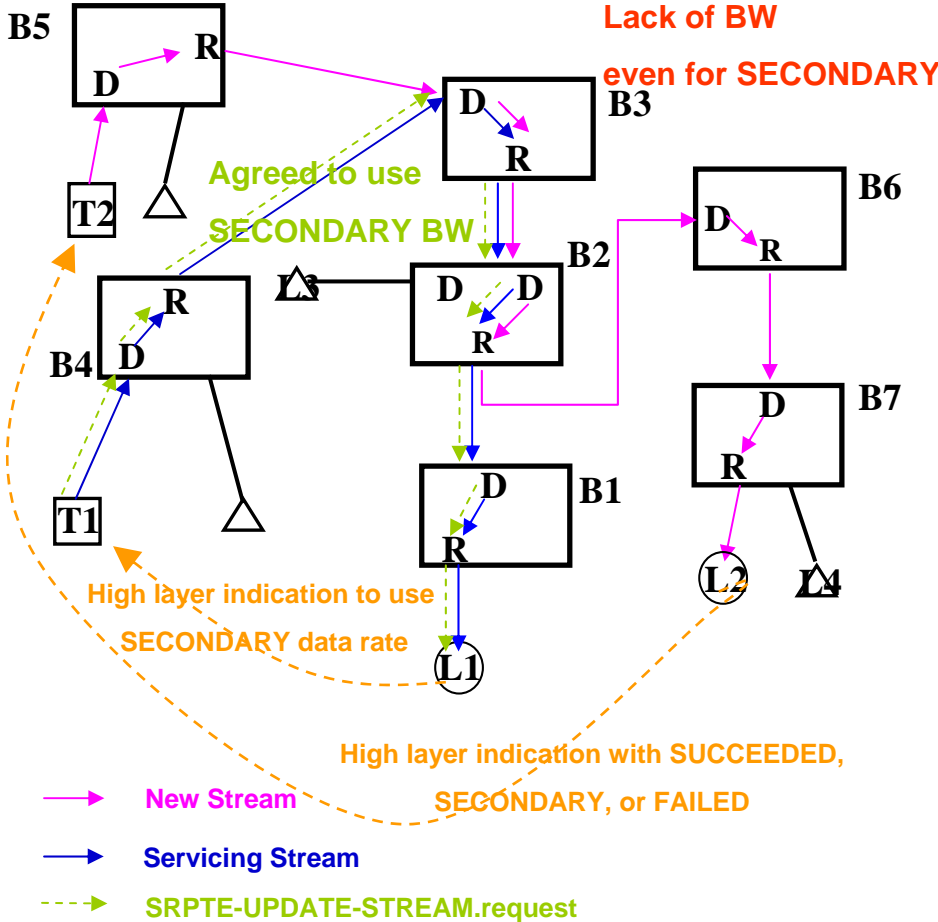◆ When all listeners agree to degrade quality for servicing new streams

Description of Reference Model 2

Static Bandwidth Reservation 2
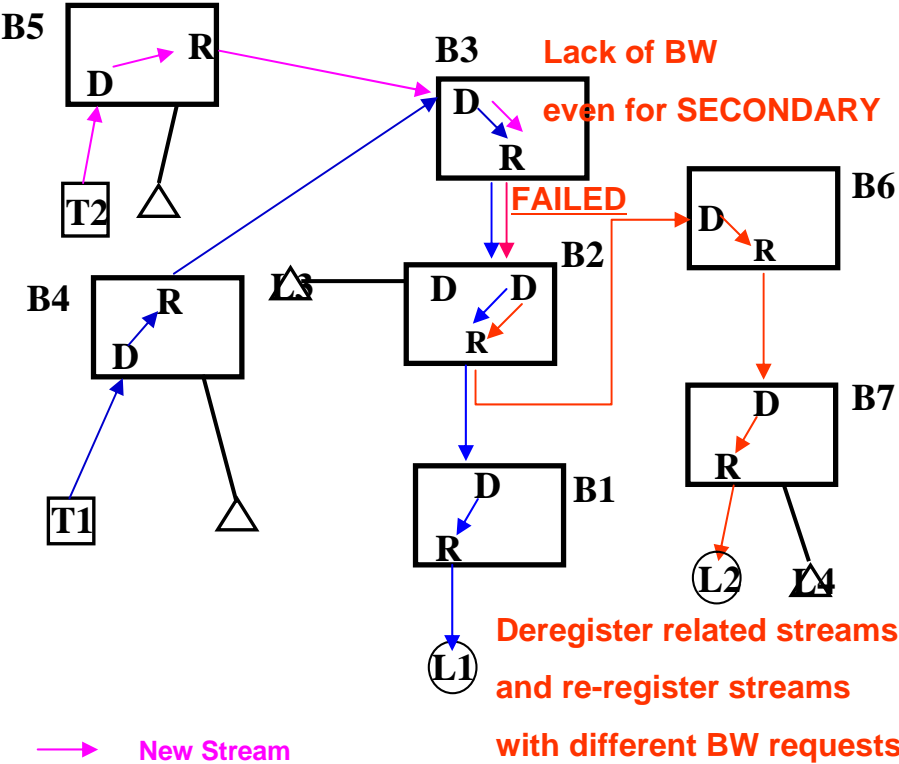
Dynamic Bandwidth Reservation 2

Description of Reference Model 2 (cont.)

❑ **General statement**

- Take resource of other streams, not by preemption but by agreement
  - ◆ If there is a stream getting service and agreeing downgraded service quality in advance, bridges are able to take the resource for new streams

❑ **Purpose**

- In order to not drop new stream reservation request by degrading quality of servicing stream

❑ **Work of .1Qav**

- Look for stream which accepted downgraded quality at bridge
- FDB should contain PRIMARY and SECONDARY bandwidth request per stream
- Temporarily reserve bandwidth and fix it after receiving another reservation message which let bridges know the result of resource reservation through high layer

Work of .1Qav for Reference Model 2

SAMSUNG Electronics   IEEE 802.1 AVB TG July 2007
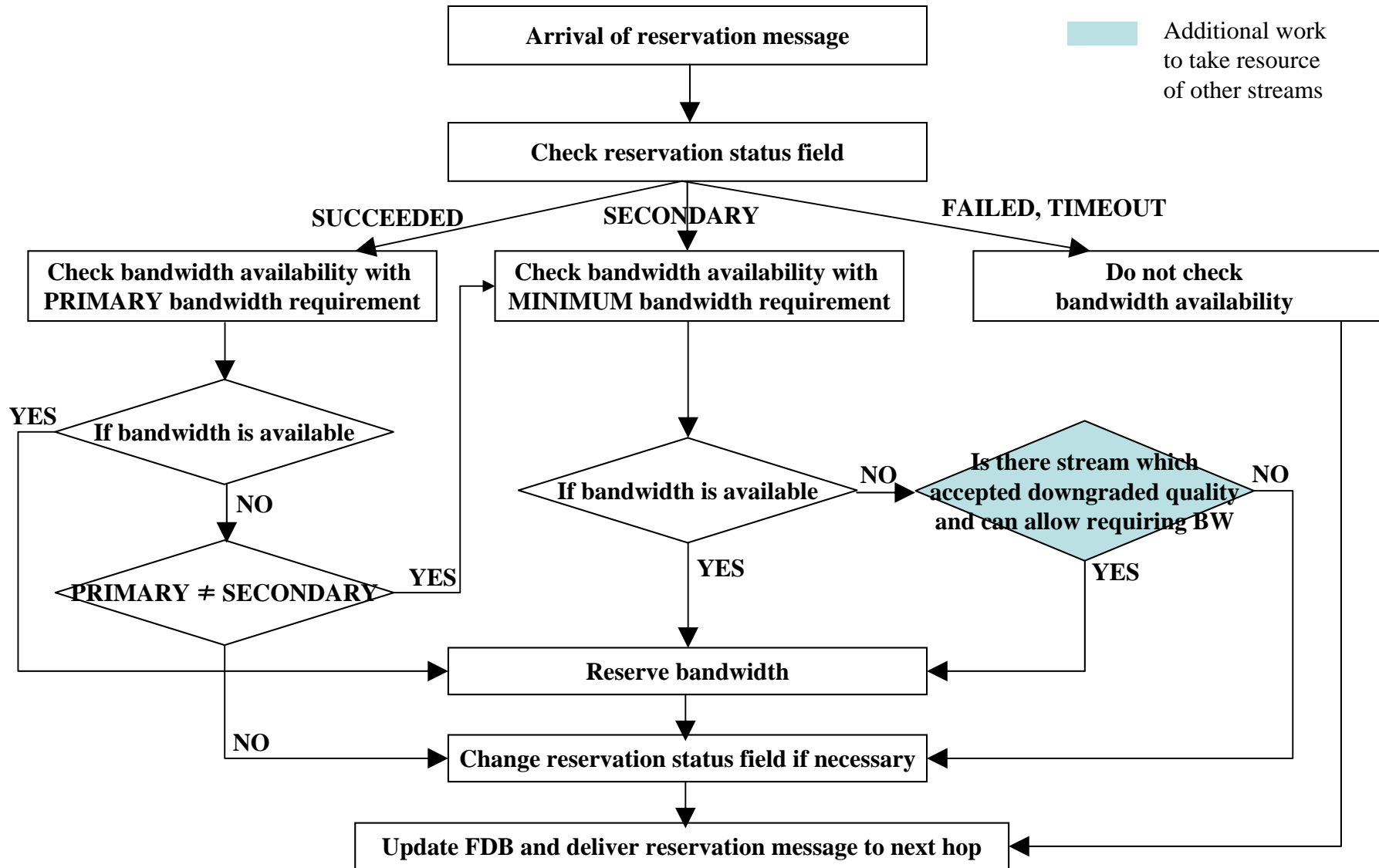
Description of Reference Model 3

Talker's Movement

→ Old Reservation Message

→ New Reservation Message
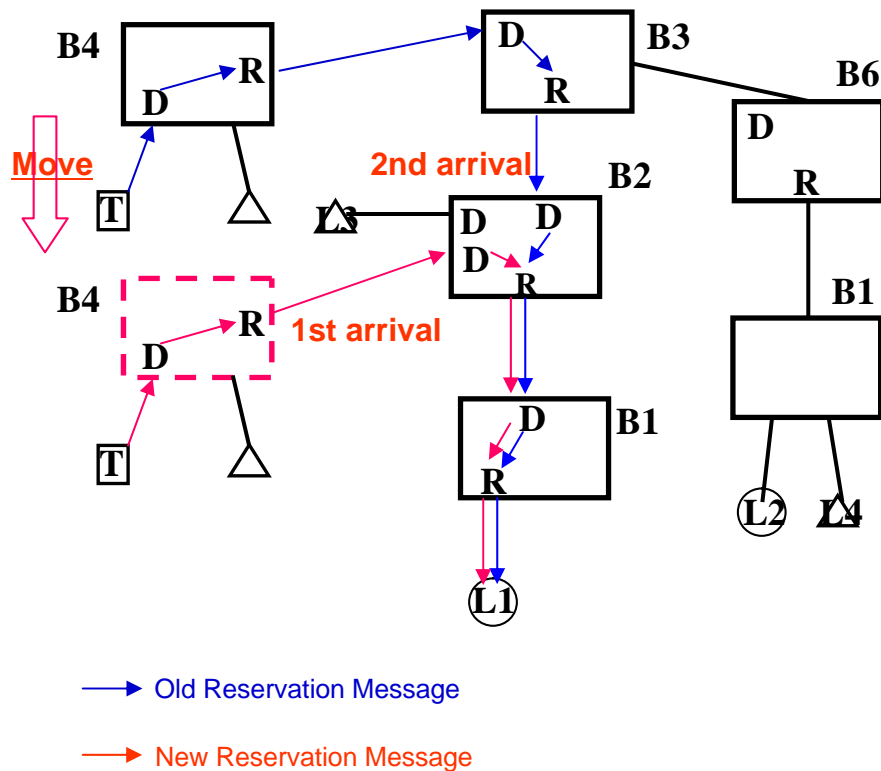
❑ Problem definition

- Bridge can be confusing what Reservation Message (RM) is new one

❑ Solutions

- Single Buffer
  - ◆ Arrived RM is identical to buffered RM? If those are same, do appropriate action at FDB (that is, keep or change the value in FDB). Or change buffered value.
- Counter
  - ◆ Intermediate switch needs a buffer and a counter, which accumulates number of consecutively incoming stream reservation messages up to threshold in order to confirm
- Sequence number of RM
  - ◆ If stream reservation message includes sequence number, intermediate switch follows latest sequence number