35.1.4.3 Designated MSRP Nodes on CSNs

A Coordinated Shared Networks (CSN) is a contention free, QoS able, time division multiplexed access, network. One of the nodes of the network acts as the Network Coordinator (NC) node granting transmission opportunities to the other nodes of the network. The NC node also acts as the QoS manager of the network.

35.1.4.3.1 Coordinated Shared Network (CSN) characteristics

CSNs support two types of transmissions: unicast transmission for node to node transmission and broadcast transmission for one node to all other nodes transmission. Each node to node link has its own bandwidth characteristics which could change over time due to the periodic ranging of the link. The broadcast transmission characteristics are the lowest common characteristics of all the links of the network.

A CSN network is physically a shared network, in that a CSN node has a single physical port connected to the half-duplex medium, but is also a logically fully-connected one-hop mesh network, in that every node could transmit to every other node using its own profile over the shared medium.

Figure 35-2 illustrates a CSN network acting as a backbone for an 802.3 network.

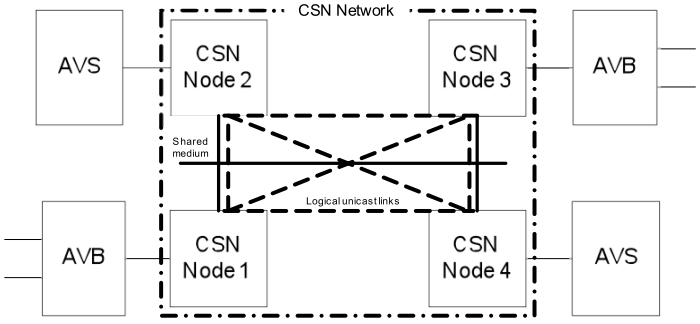


Figure 35-2 – CSN Backbone

The first node joining the CSN acts as the Network Coordinator until one of the following events occur:

1) A new node with better NC capabilities joins the network and triggers a NC handover to become the new NC node.
2) The current node acting as the Network Coordinator is gracefully shut down. Before entering its shut down process the node triggers a NC handover with one of the active nodes of the network.
3) The node acting as the NC fails and a backup node takes control of the network.

35.1.4.3.2 Designated MSRP Node handling on CSN

From the bandwidth reservation stand point a CSN network could be modeled as a “distributed” bridge as illustrated by Figure 35-3. Each node to node link is equivalent to the path from a input to an output bridge’s port.

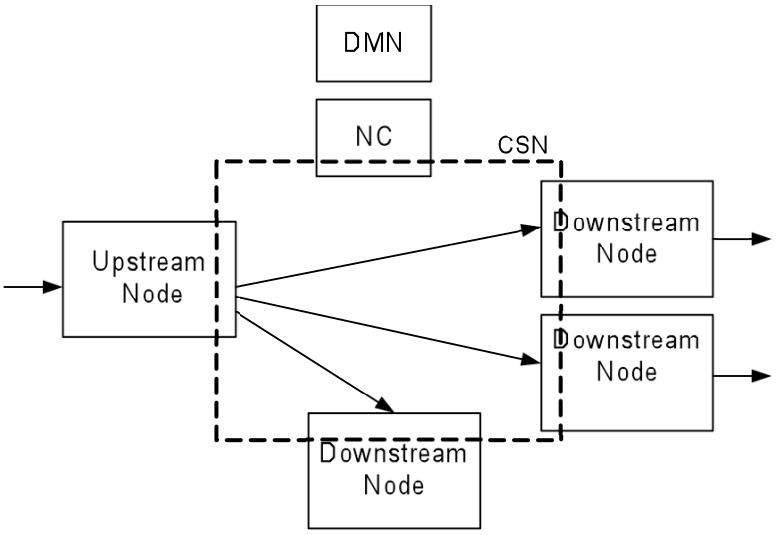


Figure 35-3 – "Distributed" Bridge CSN Model

Similarly to a bridge in which a single MSRP entity manages the bandwidth of all the ports of the bridge, a CSN is managed by a single entity called Designated MSRP Node (DMN).

MSRP assumes that on a CSN, the Designated MSRP Node (DMN) will always be co-located with the CSN's NC node. Therefore contrary to shared medium like IEEE 802.11 or IEEE 802.3 GPON where the DMN corresponds to a static node (respectively the AP or the OLT), on a CSN the DMN might dynamically migrate together with the NC node.

Over time the DMN constructs its database by handling the MSRP Talker Declarations and Listener Declarations generated by the nodes of the CSN.

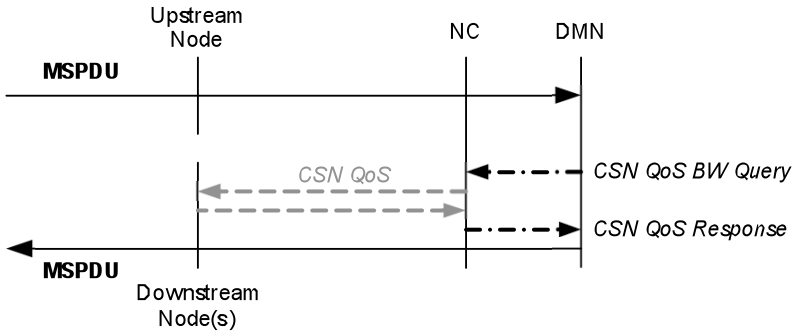
Whenever a node stops acting as an NC node, it stops being a DMN and no longer handles any MSRPDU messages.

Whenever a node becomes the CSN's new NC node, it starts to be the DMN as well and begins processing the MSRPDU messages.

Upon initialization a new DMN dynamically recreates its database by broadcasting an MRP LeaveAll message to all the nodes of the CSN. The MSRP Participant nodes answer the MRP LeaveAll message by sending an MRP JoinIn message handled by the DMN as MRP Re-Declare! messages. These re-declarations permit the new DMN to immediately build its database.

35.1.4.3.3 MSRPDU handling on a CSN

Figure 35-4 a) and 35-4 b) illustrates the flow and the handling of MSRPDU messages on a CSN.



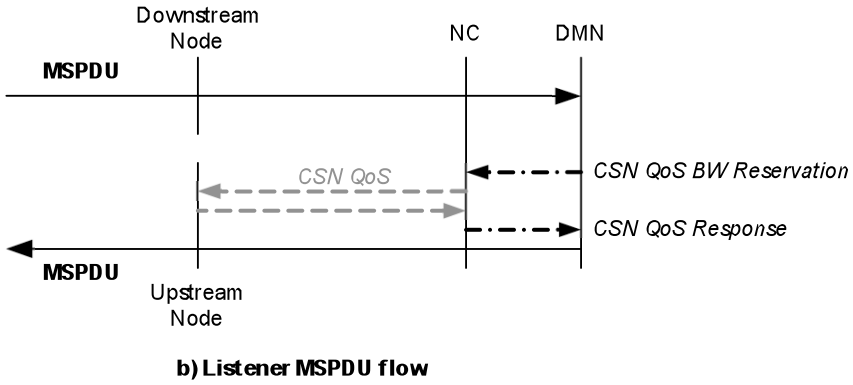


Figure 35-4 – MSRPDU flow on CSN

1) MSRPDU are handled by the CSN nodes as regular data messages with a standard 802.1Qat group destination address, and are thus delivered to the DMN thru the CSN which bridges this group destination address.
2) The DMN translates the MSRP TSPEC parameters into CSN QoS paremeters and invokes CSN QoS transactions with the CSN NC:
    a. When the DMN receives a Talker Advertise message originated from an upstream CSN node, the DMN should invoke QoS Query transactions with the CSN QoS manager to check whether or not the bandwidth advertised in the message's TSPEC is available on each upstream to downstream node link of the CSN network. In addition the DMN should map the MSPDU's TSPEC with the message's stream ID.
    b. When the DMN receives a Listener Ready message originated from a downstream CSN node, the DMN should invoke a QoS Reservation transaction with the CSN QoS manager to reserve the bandwidth associated with the message's stream ID on the downstream to usptream CSN node link.
3) After the DMN completes the CSN QoS transactions, the DMN behaves as a MSRP application on a bridge and propagates MSRP attributes as described in Clause 35.2.

35.1.4.3.3 MoCA network bandwidth management

The DMN entity within the MoCA network manages the MoCA bandwidth for the MSRP streams by invoking the MoCA native pQoS transactions. The DMN maps the MRP Attribute Declaration as described in Table 35-1.

MAD	**MoCA pQoS Transactions**	
MAD_Join.request	Check-CreateFlow	Query bandwith without reservation
MAD_Change.request ?	Update PQoS Flow	Renew the BW reservation (leased time) for a stream
MAD_Join.request	Create PQoS Flow	Reserve bandwith for a stream
MAD_Leave.request	Delete PQoS flow	Free bandwidth of a stream

Table 35-1 – MAD to MoCA pQoS Transaction mapping

Table 35-2 describes the mapping between AVB TSPEC and MoCA pQoS parameters (TSpec).

AVB TSPEC	MoCA TSPEC
Max Frame Size	Max Packet Size
Max Frame Rate, Max Class B latency per bridge (a constant)	(Max) Burst Size, Peak Data Rate

Table 35-2: AVB to MOCA TSPEC Mapping

The following formula are used to compute the MOCA TSpec parameters from the AVB TSpec parameters:

Peak Data Rate = Max Frame Size * Max Frame Rate
Max Burst Size = Peak Data Rate * Max Class B latency per bridge