AN-80i

*Advanced Broadband Wireless
Infrastructure Solutions*

PMP Operation Guide

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Chapter 1

1   Introduction

This document provides a system description for the features and configurations for the AN-80i point-to-multipoint system.

The document uses the terms *Sector Controller* and *Subscriber Station*, which correspond to the terms *master* and *slave* respectively. Throughout Redline documentation and product user interfaces, the following sets of terms are used interchangeably:

- Sector Controller (SC) / Subscriber Station (SS)
- Base Station (BS) / Subscriber
- Master / Slave

2　Key Features

2.1　Overview

The point-to-multipoint (PMP) system provides the following functions:

- VLAN tag classification, VLAN Tagging and de-tagging, VLAN mapping
- Multiple [VLAN] groups
- Multiple connections to each Subscriber Station link
- QoS CIR guarantee to individual connections with different service qualities

The PMP system introduces *link*, *group,* and *connection* configurations at the AN-80i Sector Controller. The configuration of a link contains all the relevant parameters needed to establish communication between the Sector Controller and one Subscriber Station. The group defines a restricted multicast/broadcast domain similar to a VLAN group. The group configuration also specifies how Ethernet packets are treated when they enter or exit the Ethernet port of the AN-80i Sector Controller. Each connection is defined by a parent link and a parent group, which explicitly defines (respectively) the associated Subscriber Station and multicast/broadcast domain for the connection. The connection configuration also specifies how Ethernet packets are treated when they enter or exit the Ethernet port on the AN-80i Subscriber Station designated by its parent link.

The relationship between groups and connections is similar (but not identical) to the relationship between VLANs and ports belonging to various VLANs. A major difference is that the AN-80i PMP system allows packets with different VLAN tags to be assigned to the same Group.

The AN-80i PMP system can have many groups, and each group can have many connections, with the restriction that each connection can be linked to only one group. In this way, a connection is uniquely defined by a group-link combination.

The operator can list all Connections for a specific parent Link.

Browse Connections by Link	
Connection	**Parent Link**
Voice A	Link A
Data A	Link A

An operator can list all Connections for a specific parent Group.

Browse Connections by Group	
Connection	**Parent Group**
Data A	Data
Data B	Data
Data C	Data

An example deployment demonstrating the AN-80i PMP system capabilities is shown in Figure 1.
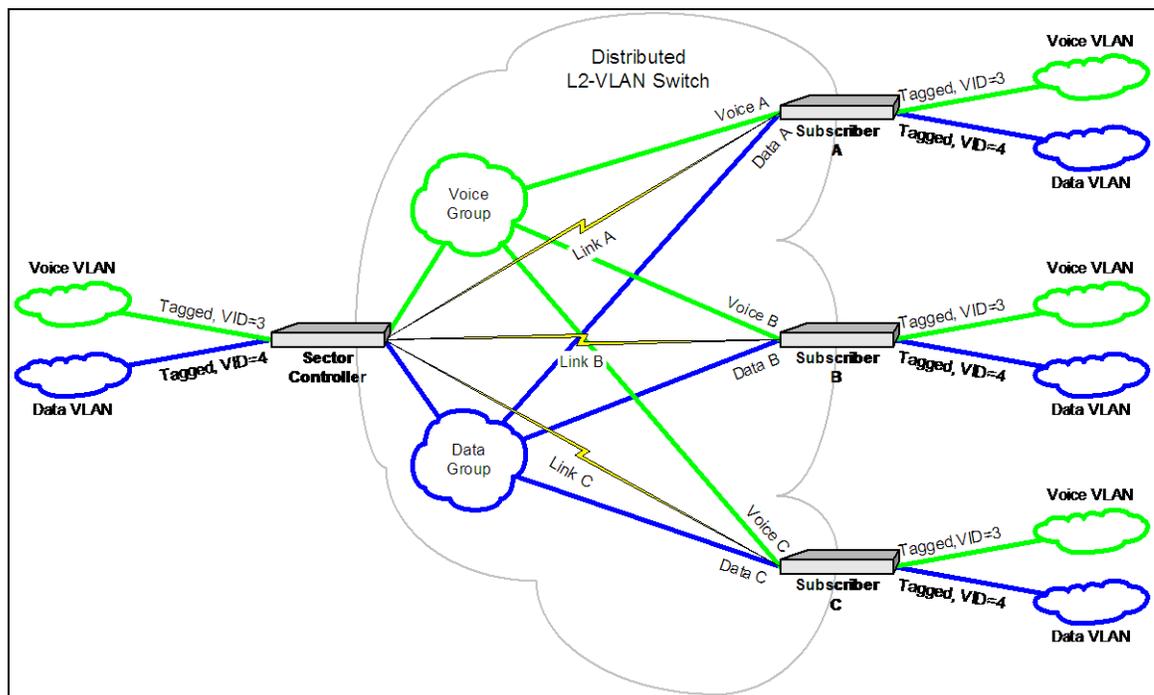
Figure 1: VLAN tags, multiple groups and multiple connections per subscriber

2.2   Link Configuration

A link configuration defines parameters necessary for wireless communication between the Sector Controller and the Subscriber Station (e.g., Subscriber MAC address, burst rate, etc). The link definition is also necessary to establish a management connection between the Sector Controller and Subscriber (to exchange configuration and statistics).
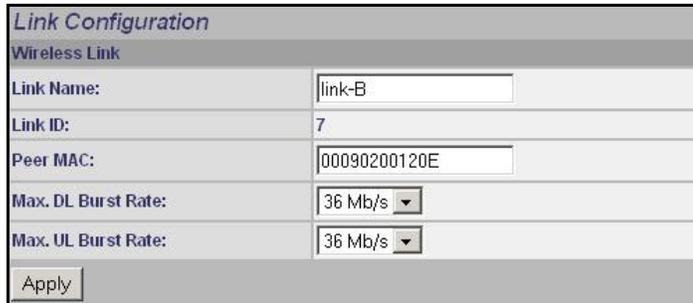
Figure 2: Link Configuration Screen

The following table provides detailed descriptions of the link configuration parameters.

Parameter	Value	Description
Link Name	Operator-assigned	Name uniquely identifying this SC/SS link.
Link ID	System-assigned	Unique identifier for this link. Used when creating a connection.
Peer MAC	MAC address	The MAC address of the corresponding subscriber.
Max DL Burst Rate	Operator-assigned	Maximum downlink burst rate. Calculated using the Redline Link Budget tool.
Max UL Burst Rate	Operator-assigned	Maximum uplink burst rate. Calculated using the Redline Link Budget tool.

2.3   Group Configuration

A group defines a restricted multicast/broadcast domain. The group configuration also specifies how Ethernet packets are treated when they enter or exit the Ethernet port of the Sector Controller. The Group Configuration screen contains two subsections: **Wireless Group** and **Wireless Traffic Parameters**.
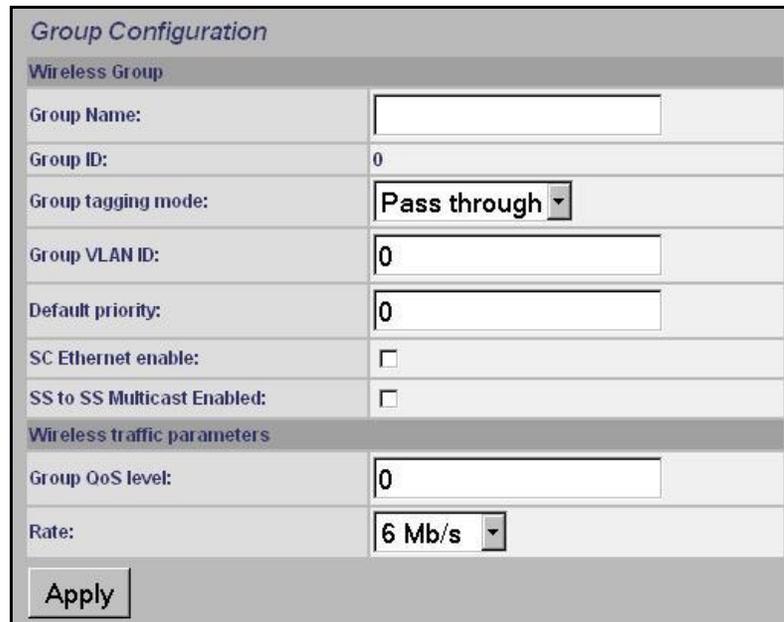
Figure 3: Group Configuration Screen

The following table provides detailed descriptions of the group configuration parameters.

Parameter	Value	Description
Group Name	Operator-assigned	Text uniquely identifying this group (e.g., Voice, Data, Video)
Group ID	System-assigned	System-assigned unique identifier of this group. Used when creating a connection.
Group Tagging Mode	Tagged/ Pass-through	If Tagged, the ingress packets (entering the Ethernet port of the AN-80i Sector Controller) are assigned to this group only if tagged with the Group VLAN ID parameter below. All ingress packets classified in this group are stripped of the VLAN tag. The priority value is preserved and transported separately to be available if the packet is re-tagged at egress on a Subscriber Station. If the packet has multiple tags, only the outermost tag will be stripped. All egress packets (exiting the Ethernet port of the AN-80i Sector Controller) are tagged with the Group VLAN ID parameter below. If Pass-through, the ingress packets that are not classified in other groups are assigned to this group regardless of being tagged or untagged. Ingress and egress packets are not modified when entering or exiting the group through this port. The system will transport the Default Priority parameter below with the packet so that, if the packet is tagged at egress on a Subscriber Station port, the Default Priority parameter will be used in the priority field.
Group VLAN ID	0…4095	Ingress and egress VID on this port. Ignored if the Group Tagging Mode parameter is Pass-through.
Default Priority	0…7	Priority to be used when packet is tagged at egress on other ports. This parameter is used only if the Group Tagging Mode parameter

Parameter	Value	Description
		is Pass-through. The system transports Default Priority together with the packet so that, if a Subscriber Station port tags the packet it knows what priority to use.
		If the Group Tagging Mode parameter is Tagged, the Default Priority parameter is ignored because in this case the system transports the priority the packet had when it entered the AN-80i Sector Controller Ethernet port, to be used if a Subscriber Station port re-tags the packet.
SC Ethernet Enable	Selected	If selected, the group has connectivity on the Ethernet port of the AN-80i Sector Controller.
	Deselected	If deselected the group has no connectivity on the Ethernet port of the AN-80i Sector Controller and all related parameters are ignored.
Group QoS Level	0 – 23	Specifies the QoS values for the multicast/broadcast traffic in the group. Generally, the Group QoS should correspond to the wireless retransmission rate of the slowest SS. 0 disables multicast/broadcast traffic. For optimum QoS values, use the AN-80i PMP Configuration tool.
SS to SS Multicast Enable	Selected	If selected, group multicast/broadcast traffic between subscribers is enabled.
	Deselected	If deselected, group multicast/broadcast traffic between subscribers is disabled.
Burst Rate	Auto	If set to Auto, the burst rate corresponds to the wireless retransmission rate of the slowest SS burst rate.
	6 – 54,	For more reliable multicast/broadcast for the group, ensure the value selected is below the slowest SS burst rate.

The **'SS to SS Multicast Enable**' feature can be used to allow or deny sending multicast/broadcast traffic from one Subscriber to other Subscribers in the same sector. This feature can be used to prevent degrading network performances and application usability during some combinations of applications and network conditions (e.g., UDP based video multicast ARP storm). It can also be used to increase the network security in a multi-subscriber scenario.

2.4   Connection Configuration

The group defines a restricted multicast/broadcast domain similar to a VLAN group. The connection configuration also specifies how Ethernet packets are treated when they enter or exit the Ethernet port of the AN-80i Sector Controller.

Connection configuration contains two subsections. The **Wireless Connection** parameters define the connection name and group-link associations. The **Wireless traffic parameters** are the Downlink and Uplink QoS levels, which must be calculated using the AN-80i PMP Configuration tool. Acting as bandwidth allocation indices, these values determine the number of bytes encapsulated in a wireless frame for each burst, and indirectly the committed connection throughput (CIR).

Figure 4: Connection Configuration Screen

Parameters of the Wireless Connection Section are described below:

Parameter	Value	Description
Connection Name	Operator-assigned	Text uniquely identifying this connection (e.g., Voice, Data, Video).
Connection ID	System-assigned	System-assigned unique identifier of this connection
Connection tagging mode	Tagged/Pass through	If Tagged, the ingress packets (entering the Ethernet port of the Subscriber Station designated by the parent link of the connection) are assigned to this connection only if tagged with the VLAN ID parameter below. All ingress packets classified in this group are stripped of the VLAN tag. The priority value is preserved and transported separately to be available if the packet is re-tagged at egress at a remote destination. If the packet has multiple tags, only the outermost one will be stripped. All egress packets (exiting the Ethernet port of the Subscriber Station designated by the parent link of he connection) are tagged with the VLAN ID parameter below. If Pass-through, the ingress packets that are not classified in other connections are assigned to this connection regardless if tagged or untagged. Ingress and egress packets are not modified when entering or exiting the parent group through this port. If ingress packets on this port are tagged at egress on another port, the Default Priority parameter below will be used in the priority field.
Connection VLAN ID	0…4095	Ingress and egress VID on this port. Parameter is ignored if the Tagging mode is 'Pass-through'.
Default Priority	0…7	Priority to be used when packet is tagged at egress on other ports. Parameter ignored when the Tagging mode parameter is Tagged. This is because egress priority copies the ingress priority field.
Link ID	System-	The parent Link ID

Parameter	Value	Description
	assigned	
Group ID	System-assigned	The parent Connection ID
DL QoS level	Operator-assigned	UBR minus 1 (e.g., 53 if UBR is set to 54 Mbps. Use the PMP Configuration Tool to calculate optimum values).
UL QoS level	Operator-assigned	UBR minus 1 (e.g., 53 if UBR is set to 54 Mbps. Use the PMP Configuration Tool to calculate optimum values).

2.5   Bandwidth Management

Communications between the AN-80i sector controller (SC) and subscribers (SS) is performed in cycles. Time Division Duplexing (TDD) is used to switch between downlink (SC=>SS) and uplink (SS=>SC) transmissions. Time Division Multiplexing (TDM) is used to switch between the multiple subscribers in the same sector.

The Quality of Service (QoS) settings for Groups and Connections are configurable in terms of CIR bit rate (bandwidth allocation). Each Connection has user-configurable uplink and downlink QoS settings to reserve minimum CIR bit rates for unicast traffic. Each Group has a user-configurable downlink QoS setting to reserve minimum CIR bit rates for multicast and broadcast traffic.

The sector controller central scheduler allocates uplink and downlink bandwidth on a frame-by-frame basis. Allocation is granted to subscribers based on a Weighted Round Robin algorithm, with the user-configured Connection and Group QoS levels acting as bandwidth allocation indices to guarantee the CIR for each connection.

It is strongly recommended to use the AN-80i PMP Configuration Tool to calculate the QoS level settings required to guarantee the desired CIR values for each connection. The cumulative QoS settings affect throughput, packet delay and jitter over the entire sector. Generally, overall lower QoS settings will result in lower latency and jitter. The tool includes a worst-case estimate for packet delay as part of the calculated results.

The general concept and the relationships of the different parameters behind the configuration tool are the following:

1. The total sector throughput (D) is defined as:

   $$D = d / T$$

where,

     d is one wireless frame length in bits for a given configuration,

     T is the duration of the wireless frame transmission in seconds. A *wireless frame* is defined as the cycle beginning with a DL transmission from the SC and ending with UL transmissions from subscribers.

2. The committed bit rate (CIR) for a connection 'i' is:

   $$CIR(i) = D * QoS(i) / \sum QoS(j)$$

where,

     D is the total sector throughput

     $QoS(i)$ is the QoS index set for the connection

     $\sum QoS(j)$ is the sum of all the QoS indices in the sector

3. The wireless frame length d is further defined as

   $$d = \sum QoS(j) \times \omega$$

where,

ΣQoS(j) is the sum of all QoS indices in the sector

ω is the wireless block size of 1 Kbits

4. The wireless frame transmission duration (T) is:

$$T = \Sigma t(j) + \Sigma W(j)$$

where,

Σt(j) is the sum of transmission time for all links in a sector

ΣW(j) is the sum of all TDD transmission time overhead within a frame

5. Additionally, the transmission time per link 'i' as t(i) is:

$$t(i) = \Sigma QoS(i) \; x \; \omega \, / \, R(i)$$

where,

ΣQoS(i) is the sum of all QoS indices for all the connections on the link

ω is the wireless block size of 1 Kbits

R(i) is the UBR for the link 'i'.

3   PMP Configuration Scenarios

3.1   VLAN Services: Default Groups and Connections

Figure 5 shows an example of VLAN usage where the traffic that is not classified to any Connection in the Voice Group, will be included in the Data Group. The Voice Group and Connections are configured for tagged traffic, and the Data Group and Connections are configured for pass-through mode. Note that the configuration does not enforce a Group to have a connection on every subscriber, or to the SC port.
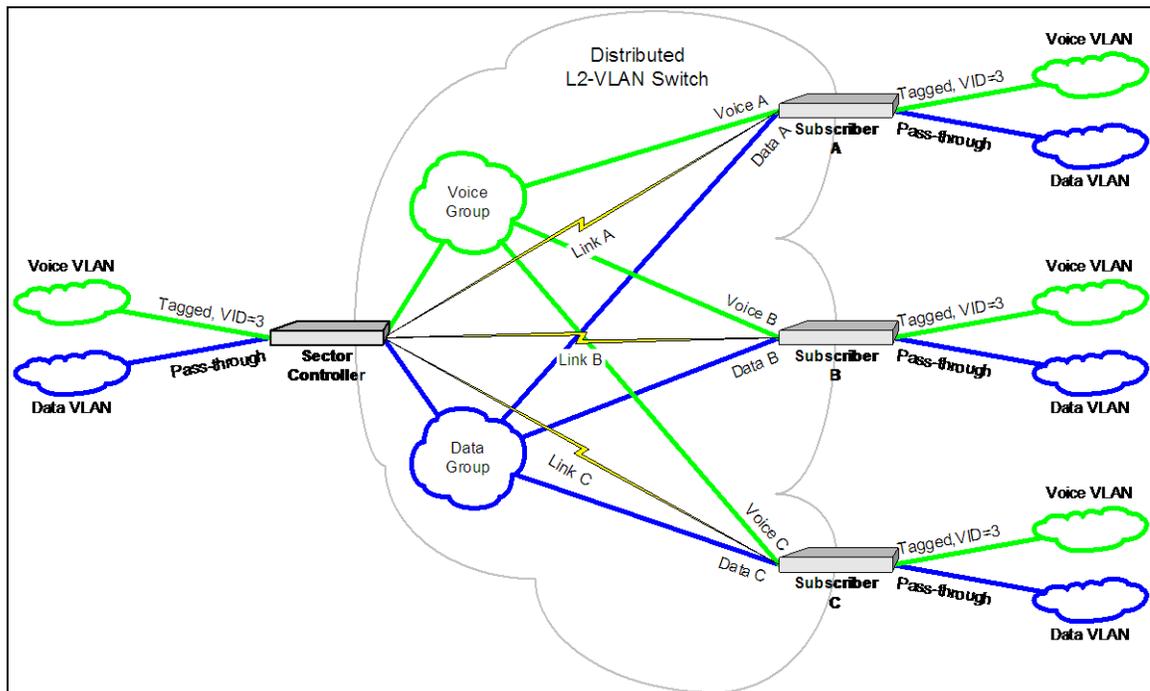
Figure 5: Default groups and connections

Below is a walk-through procedure for setting up this configuration. The procedure consists of three sets of steps:

- Creating communication links from the AN-80i Sector Controller to three Subscriber Stations.
- Defining two groups for voice and data communications.
- Creating a pair of voice and data connections to each AN-80i Subscriber Station

3.1.1   Creating Links

1. In the AN-80i Web Interface, click **New Link**. The system displays the **Link Configuration** page.
2. Enter the required parameter values and click **Apply**. The system allocates an ID for the link and refreshes the configuration page.

Figure 6: Link Configuration Screen

Note: Calculate the desired DL and UL burst rates for the link using the Redline Link Budget Tool.

3. Repeat the steps above for each additional link (B and C), specifying the required parameter values.

4. Apply the changes and save the configuration.

5. In the Web interface, browse the links and ensure the new links are present.

Figure 7: Configured Links Browse Screen

3.1.2 Defining Data and Voice Groups

6. In the AN-80i Web Interface, click **New Group**. The system displays the **Group Configuration** page.

7. Enter the required parameter values for the Data group:

Parameter	Value
Group Name	Data
Group ID	(System-assigned)
Group Tagging Mode	Pass-through
Group VLAN ID	N/A
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enable in order for the base station to be part of the broadcast domain
Group QoS level	(Calculate using PMP Configuration tool)

8. Click **Apply**. The system allocates an ID for the group and refreshes the configuration page.

Figure 8: Group Configuration Screen

9. Repeat the steps above to define the Voice group, entering the corresponding parameter values:

Parameter	Value
Group Name	Voice
Group ID	(System-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	3
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enable in order for the base station to be part of the broadcast domain
Group QoS level	(calculate using PMP Configuration tool)

10. Apply the changes and save the configuration. You should now be able to browse the newly created groups.

Figure 9: Configured Groups Browse Screen

3.1.3   Creating Voice and Data Connections

11. Note the parent Group and Link ID combinations that you will use for creating a pair of connections (Voice and Data) to each Subscriber Station:

Parameter	Value
Data Connections	Link ID: 4/Group ID: 8
	Link ID: 5/Group ID: 8
	Link ID: 6/Group ID: 8
Voice Connections	Link ID: 4/Group ID: 7
	Link ID: 5/Group ID: 7
	Link ID: 6/Group ID: 7

12. In the AN-80i Web Interface, click **New Connection**. The system displays the Connection Configuration page.

13. Create the Data connections, entering required parameter values:

Parameter	Value
Connection Name	Data A (B, C)
Connection ID	(system-assigned)
Connection tagging mode	Pass-through
Connection VLAN ID	N/A
Default Priority	0..7 (operator-assigned)
Link ID	4 (5, 6)
Group ID	8
DL QoS	(calculate using PMP Configuration tool)
UL QoS	

14. Create the Voice connections, entering required parameter values:

Parameter	Value
Connection Name	Voice A (B, C)
Connection ID	(system-assigned)
Connection tagging mode	Tagged
Connection VLAN ID	3
Default Priority	0..7 (operator-assigned)
Link ID	4 (5, 6)
Group ID	7
DL QoS	(calculate using PMP Configuration tool)

15. Save the configuration. You should now be able to list your connections by Group or Link. For example, to list your Data connections, follow the following steps:

    a) In the AN-80i Web Interface, click Groups. The system lists the two existing groups (Voice and Data).

    b) In the Data row, click **Expand**. The system expands your selection and displays your Data Connections:
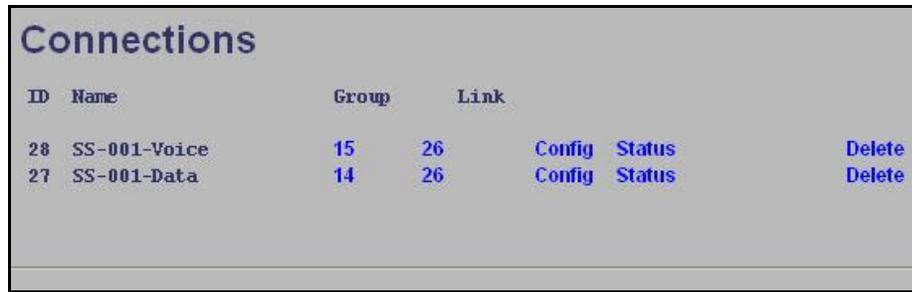
Connections

ID	Name	Group	Link				
28	SS-001-Voice	15	26	Config	Status		Delete
27	SS-001-Data	14	26	Config	Status		Delete

Figure 10: Configured Connections Browse Screen

16. To modify configuration parameters of a connection, click the corresponding **Config** link.

3.2 VLAN Services: Strict VLAN

Figure 11 shows an example of VLAN usage where only tagged traffic is allowed to pass through the system. If a Subscriber port has no pass-through connection, or the Sector Controller port has no pass-through group, then that port does not accept untagged traffic or tags that are not explicitly configured. In Figure 1 all connections and all groups are configured with port tagging enabled.
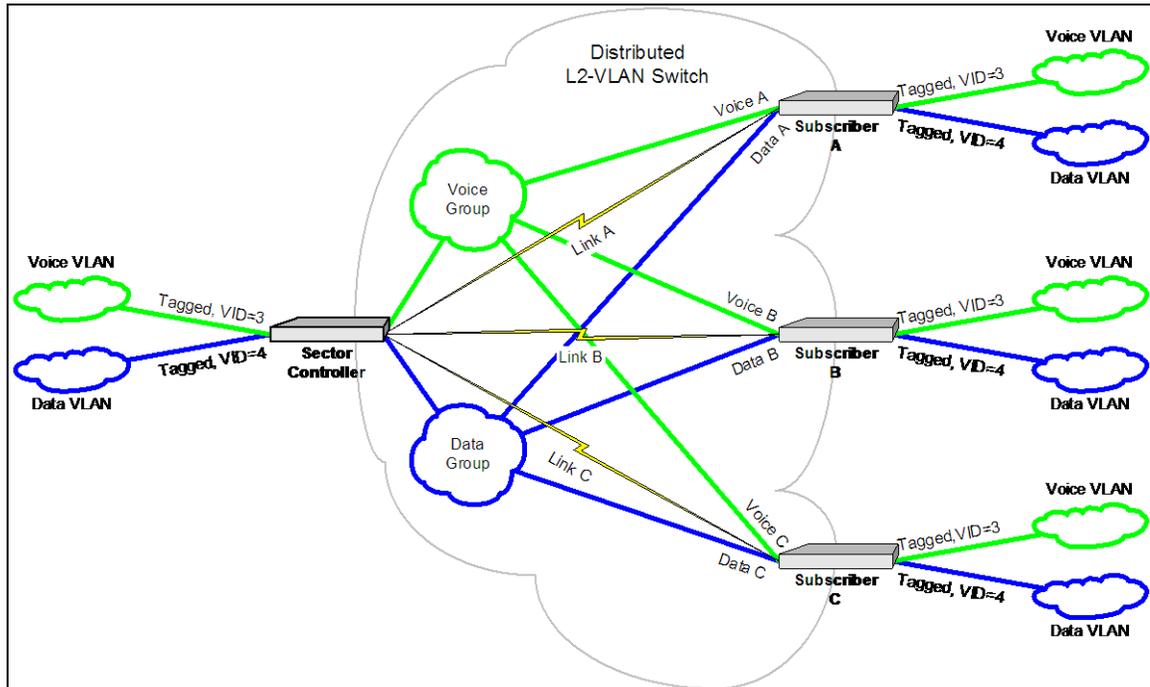
Figure 11: Strict VLAN

To configure your AN-80i PMP system for this scenario, follow these steps:

17. Create three SC-to-SS (Link A, Link B, Link C). Note the system-allocated Link IDs.

18. Create two groups, Voice and Data. Supply required parameters as shown in the tables below. When complete, note the system-allocated Group IDs.

Data Group Parameter	Value
Group Name	Data
Group ID	(system-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	4
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

Voice Group Parameter	Value
Group Name	Voice
Group ID	(system-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	3
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

19. Create three connections for each Group. Supply required parameters as follows:

Parameter	Voice A	Voice B	Voice C
Connection Name	Voice A	Voice B	Voice C
Connection ID	(system-assigned)	(system-assigned)	(system-assigned)
Connection Tagging mode	Tagged	Tagged	Tagged
Connection VLAN ID	3	3	3
Default Priority	0..7 (operator-assigned)	0..7 (operator-assigned)	0..7 (operator-assigned)
Link ID	System-assigned number for Link A	System-assigned number for Link B	System-assigned number for Link C
Group ID	System-assigned number for Voice Group	System-assigned number for Voice Group	System-assigned number for Voice Group
DL QoS	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)

Parameter	Data A	Data B	Data C
Connection Name	Data A	Data B	Data C
Connection ID	(system-assigned)	(system-assigned)	(system-assigned)
Connection Tagging mode	Tagged	Tagged	Tagged
Connection VLAN ID	4	4	4
Default Priority	0..7 (operator-assigned)	0..7 (operator-assigned)	0..7 (operator-assigned)
Link ID	System-assigned number for Link A	System-assigned number for Link B	System-assigned number for Link C
Group ID	System-assigned number for Data Group	System-assigned number for Data Group	System-assigned number for Data Group
DL QoS	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)

3.3   VLAN Services: VLAN Mapping

Figure 12 shows an example of the AN-80i VLAN mapping feature. Similar to LSR in MPLS, AN-80i PMP system can map (change) the VLAN tag depending on the ingress and egress port. This is very easy to configure because, for each group, the VLAN tag is separately specified on the Sector Controller and Subscriber Station ports.

The example in Figure 12 has the VLAN tag for the connection Voice C set to 777, while all other ports for the Voice group are set to 3. A packet classified as belonging to the Voice Group will exit the Ethernet port on Subscriber C tagged with VID=777 and will exit all the other ports with VID=3. A packet will be considered belonging to the Voice Group on Subscriber C if tagged with VID=777. A packet will be considered belonging to the Voice Group on all other stations if tagged with VID=3.
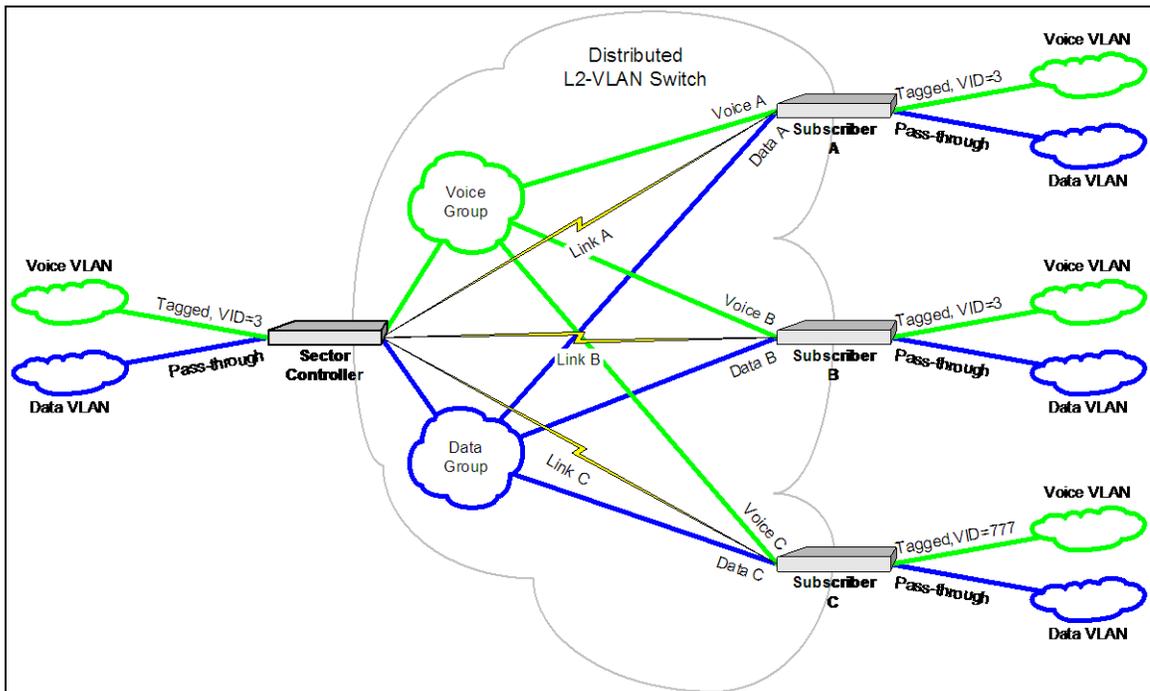
Figure 12: VLAN mapping

To configure your AN-80i PMP system for this scenario, follow these steps:

20. Create three SC-to-SS links (Link A, Link B, Link C). Note the Link IDs.

21. Create two groups, Voice and Data. Supply required parameters as follows: When complete, note the system-allocated Group IDs.

Data Group Parameter	Value
Group Name	Data
Group ID	(system-assigned)
Group Tagging Mode	Pass-through
Group VLAN ID	N/A
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

Voice Group Parameter	Value
Group Name	Voice
Group ID	(system-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	3
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

22. Create three connections for each Group. Supply required parameters as follows:

Parameter	Voice A	Voice B	Voice C
Connection Name	Voice A	Voice B	Voice C
Connection ID	(system-assigned)	(system-assigned)	(system-assigned)
Connection Tagging mode	Tagged	Tagged	Tagged
Connection VLAN ID	3	3	3
Default Priority	0..7 (operator-assigned)	0..7 (operator-assigned)	0..7 (operator-assigned)
Link ID	System-assigned number for Link A	System-assigned number for Link B	System-assigned number for Link C
Group ID	System-assigned number for Voice Group	System-assigned number for Voice Group	System-assigned number for Voice Group
DL QoS	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)

Parameter	Data A	Data B	Data C
Connection Name	Data A	Data B	Data C
Connection ID	(system-assigned)	(system-assigned)	(system-assigned)
Connection Tagging mode	Pass-through	Pass-through	Pass-through
Connection VLAN ID	N/A	N/A	N/A
Default Priority	0..7 (operator-assigned)	0..7 (operator-assigned)	0..7 (operator-assigned)
Link ID	System-assigned number for Link A	System-assigned number for Link B	System-assigned number for Link C
Group ID	System-assigned number for Data Group	System-assigned number for Data Group	System-assigned number for Data Group
DL QoS	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)

3.4   TLS: Extended TLS and Double Tagging

Figure 13 shows an extension of this configuration in which the TLS is extended via the Sector Controller and over the backbone to other locations. In order to keep the TLS traffic separate from the rest of the network, the Sector Controller port for the TLS Group is configured 'tagged' by a user-specified VID referred to in this example as TLS VID.

This solution allows unmodified traffic to be exchanged between Network B, Network C, and a remotely located network called TLS Network. If Subscriber B receives a tagged Ethernet packet from Network B (or Subscriber C receives a tagged Ethernet packet from Network C) the packet will exit the Sector Controller port double-tagged. When the Sector Controller receives a double-tagged packet from the TLS network that is classified into the TLS Group, it removes the outer tag before forwarding it to Network B or C.
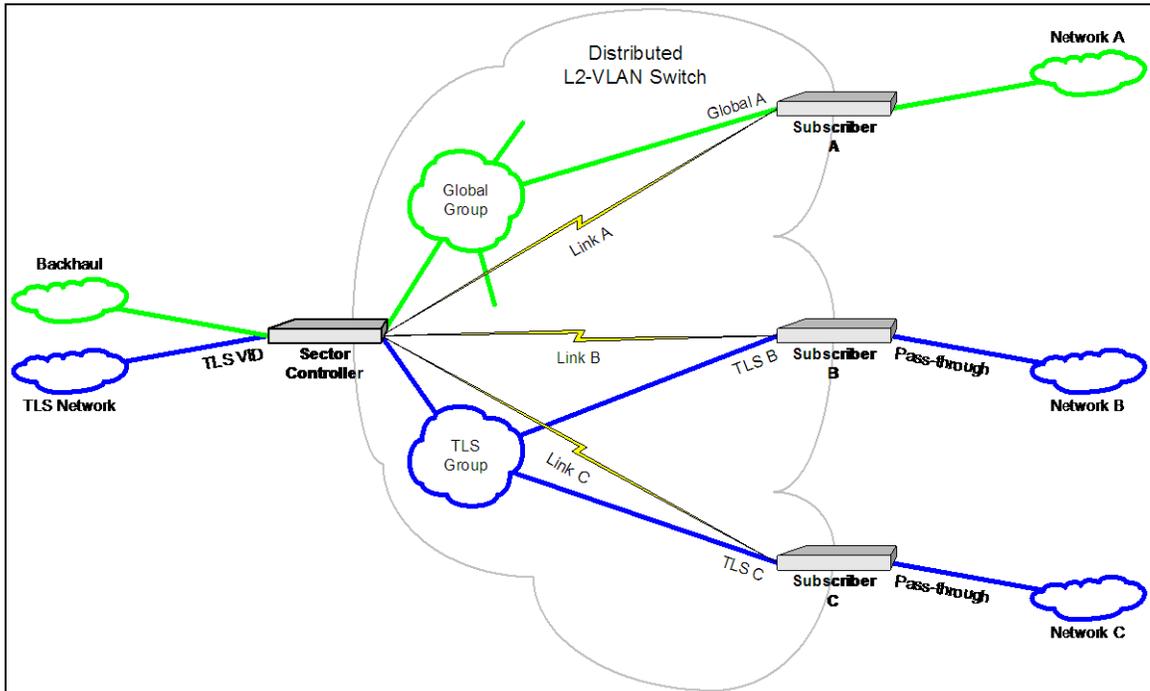
Figure 13: Out-of-sector TLS

To configure your AN-80i PMP system for this scenario, follow these steps:

23. Create three SC-to-SS links (Link A, Link B, Link C). Note the system- Link IDs.

24. Create two groups, Global and TLS. Supply required parameters as shown in the tables below. When complete, note the system-allocated Group IDs.

Global Group Parameter	Value
Group Name	Global
Group ID	(system-assigned)
Group Tagging Mode	Pass-through
Group VLAN ID	N/A
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

TLS Group Parameter	Value

Group Name	TLS
Group ID	(system-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	Operator-assigned TLS VID
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

25. Create a connection for the Global Group and two connections for the TLS Group. Supply required parameters as follows:

Parameter	Global A	TLS B	TLS C
Connection Name	Global A	TLS B	TLS C
Connection ID	(system-assigned)	(system-assigned)	(system-assigned)
Connection Tagging mode	Pass-through	Pass-through	Pass-through
Connection VLAN ID	N/A	N/A	N/A
Default Priority	0..7 (operator-assigned)	0..7 (operator-assigned)	0..7 (operator-assigned)
Link ID	System-assigned number for Link A	System-assigned number for Link B	System-assigned number for Link C
Group ID	System-assigned number for the Global Group	System-assigned number for TLS Group	System-assigned number for TLS Group
DL QoS	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)

3.5   Port-based Tagging: Port-by-Port Tagging

Figure 14 shows an example of port-based tagging in which all Subscriber ports are un-tagged and the Sector Controller port traffic is tagged depending on source or destination Subscriber port. For every tag at the Sector Controller, a distinct group is defined and each group has exactly one connection on the required link (Subscriber port).

Note that the tagged port is not necessarily the Sector Controller port, and may be one of the Subscriber ports. Note also in Figure 14 that tagged traffic entering one of the Subscribers exits the Sector Controller port double-tagged.
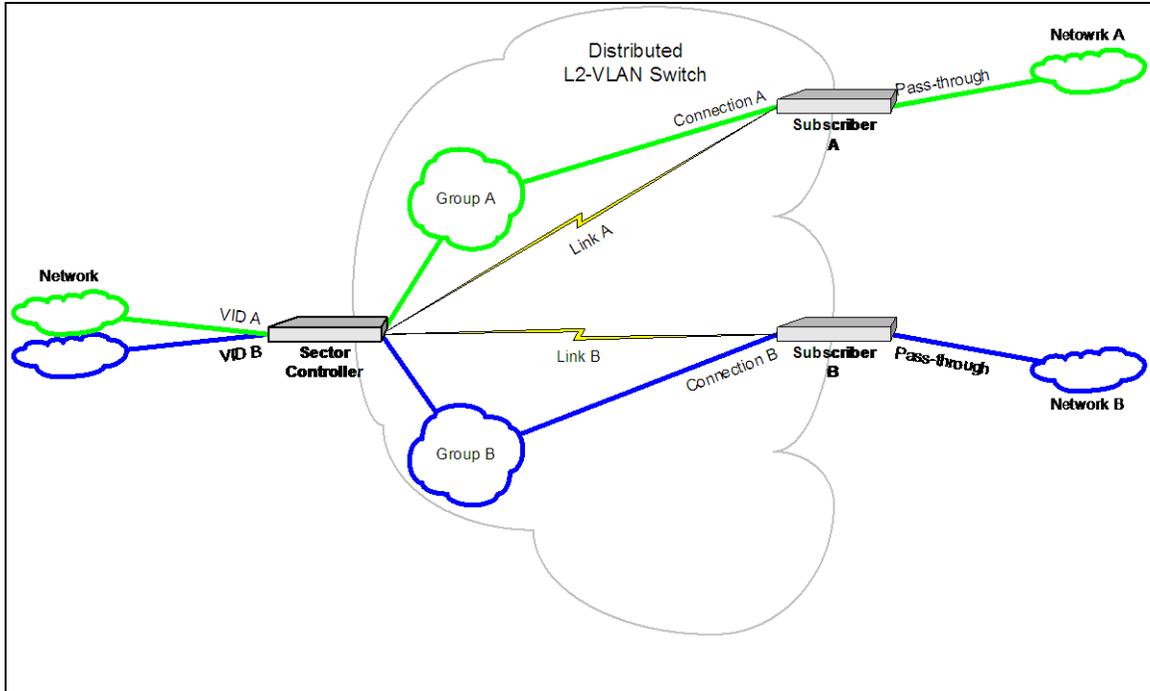
Figure 14: Port-by-port tagging

To configure your AN-80i PMP system for this scenario, follow these steps:

26. Create two SC-to-SS links (Link A, Link B). Note the system-allocated Link IDs.

27. Create two groups, Group A, and Group B. Supply required parameters as shown in the tables below. When complete, note the system-allocated Group IDs.

Group A Parameter	Value
Group Name	Global
Group ID	(system-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	Operator-assigned VID B
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

Group B Parameter	Value
Group Name	TLS
Group ID	(system-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	Operator-assigned VID B
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

28. Create a connection for each Group and supply required parameters as follows:

Parameter	Connection A	Connection B
Connection Name	Connection A	Connection B
Connection ID	(system-assigned)	(system-assigned)
Connection Tagging mode	Pass-through	Pass-through
Connection VLAN ID	N/A	N/A
Default Priority	0..7 (operator-assigned)	0..7 (operator-assigned)
Link ID	System-assigned number for Link A	System-assigned number for Link B
Group ID	System-assigned number for Group A	System-assigned number for Group B
DL QoS	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)

3.6   Port-based Tagging: Tagging Groups of Ports

Figure 15 shows an extension of the previous port-by-port tagging example where a group can have more than one connection (i.e., the same tag extends over a number of Subscriber ports).
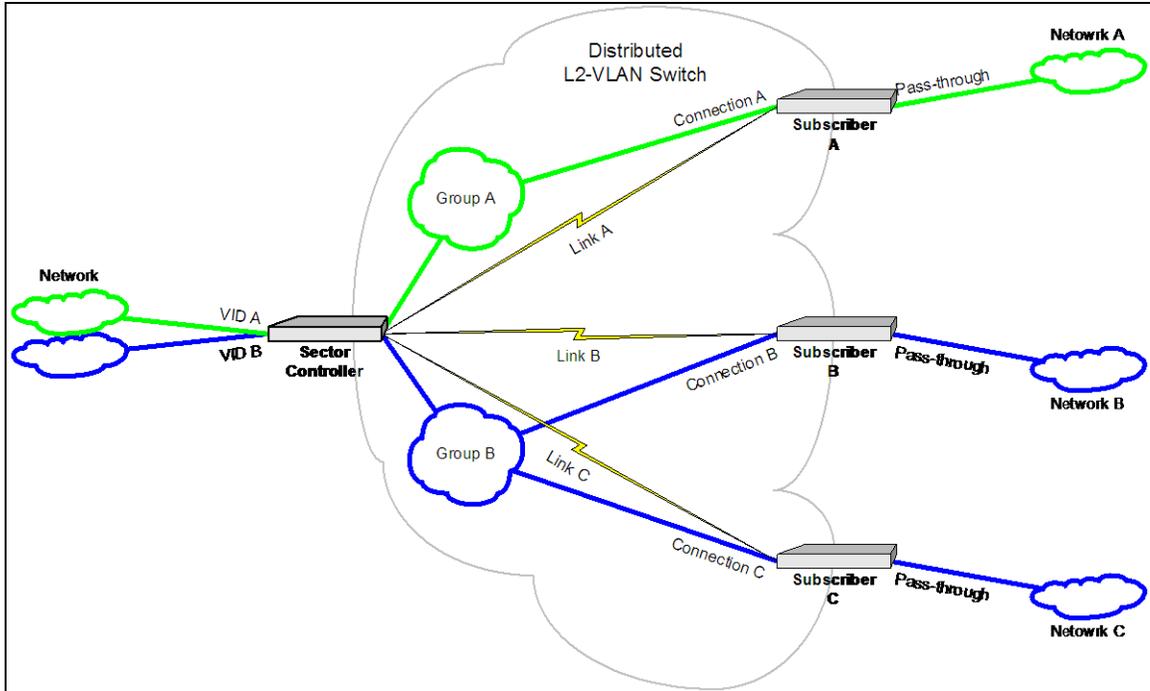
Figure 15: Tagging groups of ports

To configure your AN-80i PMP system for this scenario, follow these steps:

29. Create three SC-to-SS links (Link A, Link B, Link C). Note the system-allocated Link IDs.

30. Create two groups, Group A, and Group B. Supply required parameters as shown in the tables below. When complete, note the system-allocated Group IDs.

Group A Parameter	Value
Group Name	Global
Group ID	(system-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	Operator-assigned VID A
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

Group B Parameter	Value
Group Name	TLS
Group ID	(system-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	Operator-assigned VID B
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

31. Create a connection for Group A and two connections for Group B. Supply required parameters as follows:

Parameter	Connection A	Connection B	Connection C
Connection Name	Connection A	Connection B	Connection C
Connection ID	(system-assigned)	(system-assigned)	(system-assigned)
Connection Tagging mode	Pass-through	Pass-through	Pass-through
Connection VLAN ID	N/A	N/A	N/A
Default Priority	0..7 (operator-assigned)	0..7 (operator-assigned)	0..7 (operator-assigned)
Link ID	System-assigned number for Link A	System-assigned number for Link B	System-assigned number for Link C
Group ID	System-assigned number for Group A	System-assigned number for Group B	
DL QoS	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)

4 AN-80i PMP System Management

The management connection is for internal management data only. This data is not visible to the user, and the connection does not transport any user traffic over the wireless. Management over-the-wireless is enabled when a data connection dedicated for management traffic is defined with a desired QoS level.

4.1 Tagged Traffic in a Global Group

If all connections in the system have a single parent group and the port configuration is Pass-through both in the group and in all connections, an operator may choose to deploy an external switch at the core network to add/remove management VLAN tags on ingress/egress.

Note: In this case an operator must enable the **Tag for Mgmt** option (and enter the management VID) in the **System Configuration** screen of the appropriate AN-80i system.

4.2 System Management with Untagged Traffic

System management with untagged traffic is the simplest configuration. All data and management traffic flow through pass-through connections from a Global Group, as shown in section 3.5: Port-based Tagging: Port-by-Port Tagging on page 25.

*Important: An operator must ensure that the **Tag for Mgmt** option is unchecked in the System Configuration screens of all systems.*

4.3 Tagged Traffic: Through a Designated Management Group

Figure 16 describes a system management scenario where management traffic is tagged at the Sector Controller as well as the Subscribers. The system will map (change) the VLAN tags depending on the ingress and egress ports.
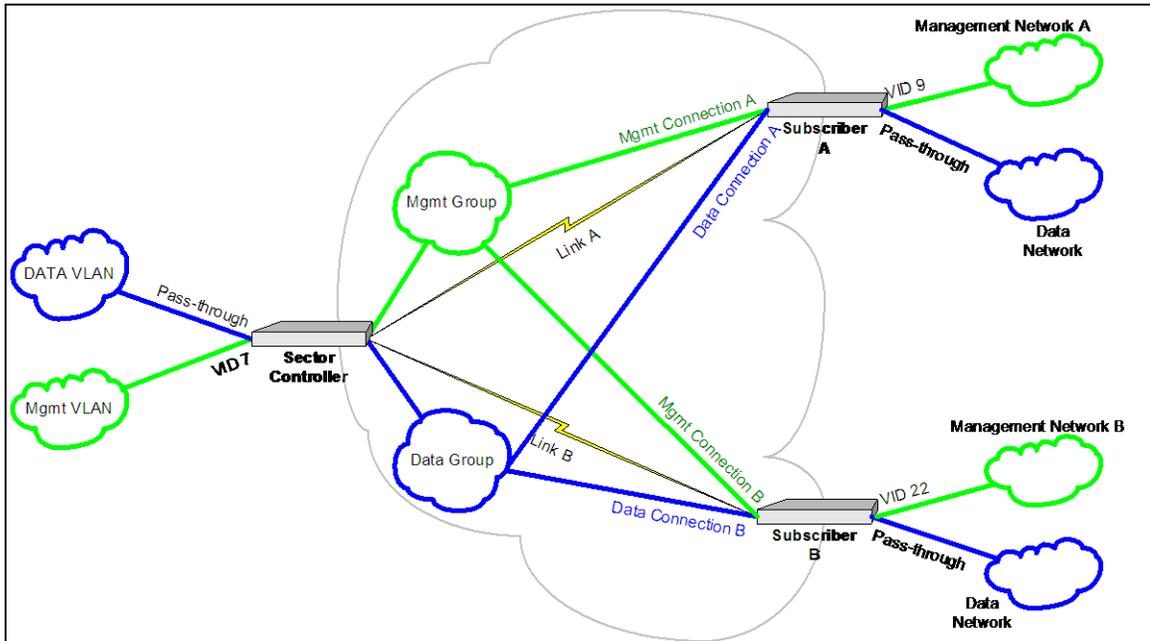
Figure 16: System Management with Tagged Traffic

To configure your AN-80i PMP system for this scenario, follow these steps:

32. On the System Configuration screen of your Sector Controller system, enable the **Mgmt. Tag Enable** checkbox and specify the management VID ('7' according to the scenario).
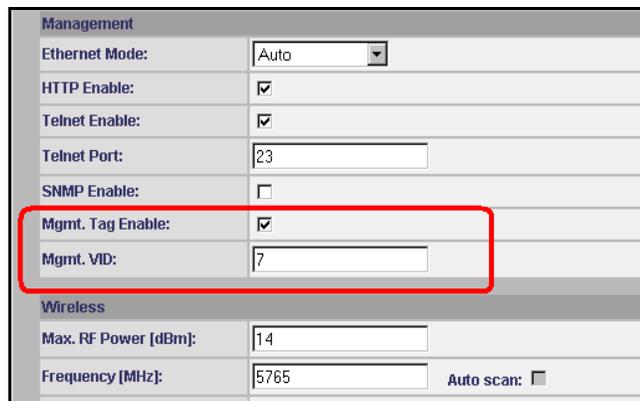
Figure 17: Management Tagging Fields

33. Repeat Step 1 on the two Subscriber systems, specifying the appropriate management VIDs (9 for Subscriber A and 22 for Subscriber B).

34. Create two SC-to-SS links (Link A, Link B). Note the system-allocated Link IDs.

35. Create two groups, Management and Data. Supply required parameters as shown in the tables below. When complete, note the system-allocated Group IDs.

Mgmt Group Parameter	Value
Group Name	Mgmt

4Gon   www.4Gon.co.uk   info@4gon.co.uk   Tel: +44 (0)1245 808295   Fax: +44 (0)1245 808299

Group ID	(system-assigned)
Group Tagging Mode	Tagged
Group VLAN ID	7
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

Data Group Parameter	Value
Group Name	Data
Group ID	(system-assigned)
Group Tagging Mode	Pass-through
Group VLAN ID	N/A
Default Priority	0..7 (operator-assigned)
SC Ethernet enable	Enabled
Group QoS level	(calculate using PMP Configuration tool)

36. Create the two management and two data connections per each group:

Connection Parameter	Management A	Management B	Data A	Data B
Connection Name	Mgmt A	Mgmt B	Data A	Data B
Connection ID	(system-assigned)	(system-assigned)	(system-assigned)	(system-assigned)
Connection Tagging mode	Tagged	Tagged	Pass-through	Pass-through
Connection VLAN ID	9	22	N/A	N/A
Default Priority	0..7 (operator-assigned)	0..7 (operator-assigned)	0..7 (operator-assigned)	0..7 (operator-assigned)
Link ID	System-assigned number for Link A	System-assigned number for Link B	System-assigned number for Link A	System-assigned number for Link B
Group ID	System-assigned number for the Mgmt Group	System-assigned number for the Mgmt Group	System-assigned number for the Data Group	System-assigned number for the Data Group
DL QoS	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)	(calculate using PMP Configuration tool)