



# Configuring IP aggregates

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### 1 Overview

You can configure an IP connection as an aggregate link. The IP aggregate enables use of an IP connection as a normal aggregate link, to multiplex voice and data between two Vocality units. Whilst the voice is carried over an IP link, this is not industry standard Voice over IP (VoIP).

Since there is no clock relationship maintained over an ethernet connection, a clocking protocol has been designed to enable Vocality units at either end of an IP aggregate link to maintain clock synchronisation. One unit is assigned as clock master and the other unit changes clock to stay in synchronisation with the master unit. When using IP aggregate mode, your unit assumes that it will be provided with the required Quality of Service (QoS) from the network, including Committed Information Rate (CIR) measured in kbps. If this QoS is not provided then packets may be dropped on the aggregate link. Due to aggregation of multiple services over the aggregate, loss of a single packet may impact several services. With default settings, the aggregate link itself will not drop unless there have been no packets received for at least 30 seconds. As with any IP network there will be instantaneous values of IP packet size that will be greater than the CIR, in which case the network access device will be expected to handle these, by use of a buffer.

### 2 Hardware configuration

You need IP connectivity between the units at either end of an IP aggregate tunnel.

### 3 Software configuration

The steps which follow describe the configuration sequence for an IP aggregate.

First, you will need to configure the IP port with a valid IP address on the **IP > Networks menu**

Chan	DBA IP	Address	Mask	MTU	UDPGw	TCPGw	Bridge	Dest
UPLNK	NUM	192.168.000.139	255.255.255.000	1514	<input type="radio"/> OFF <input checked="" type="radio"/> ON	<input type="radio"/> OFF <input checked="" type="radio"/> ON	<input type="radio"/> OFF <input checked="" type="radio"/> ON	

Figure 1 IP > Networks menu

Next you need to create a new IP aggregate on the **IP > IP Aggregates menu**.

A typical point-to-point IP aggregate, with no other clocks in the system, will have TX CLOCK for the IP aggregate at the master end of the link set to '<GC1' (master or internal clock), as shown below, and on the other end '-'.

**Note: Use <Spacebar> to toggle through alternative parameter settings.**



Figure 2 IP Aggregates menu - Node 1

In this example an IP aggregate is configured between Node 2 and Node1.

**Note: If there is more than one IP aggregate present on a node, then each one must use a different UDP port.**

Node 2 is configured, as shown in Figure 3 , as the slave end of the link, that means TX CLOCK is set to '-'.

Figure 3 IP Aggregates menu - Node 2

On both units, the clock reference is set on the **Clocking menu**, using the <Spacebar> to scroll through choices, then selecting the appropriate settings:

- GC1 SOURCE TYPE: 'IP Agg'
- GC1 SOURCE CLOCK: 'ToNode1'

	PRIMARY	BACKUP	TERTIARY
GC1 SOURCE TYPE :	IPAgg	Internal	Internal
SOURCE CLOCK :	ToNode1	-	-

Figure 4 Clocking menu



If a reference is available which is already driving GC1 or GC2, then the master end will have 'TX CLOCK' set as '<GC1' or '<GC2' accordingly.

## 4 Routing

### 4.1 IP routing

Description	Destination	Mask	NextHop	Pref	Table
WAN Link	010.001.000.002	255.255.255.248	192.168.000.001	1	BOTH

Figure 5 IP static route table

If you want to connect the IP aggregate across a WAN, rather than a LAN or ethernet crossover cable, then a route needs to be entered in the **IP > Route Management > IP Static Route Table**. This tells your unit what the next hop (gateway) is for the required destination, that is the peer Vocality IP address.

### 4.2 Vocality routing

You will then need to enter a route in the **Vocality Routing menu**, so that tributaries can be directed down the IP aggregate: the IP aggregate does not fully exist until a Vocality route is defined which uses it.

Go to the **Vocality Routing menu** and select the nodes/slots/channels to route over the IP aggregate. Use 'IP' as the 'Agg' value and the IP aggregate description as the 'Connect Using' value, to match the IP aggregate configured above. The description must be identical to that used in the IP Aggregate configuration page.

Throughout the configuration of the Vocality multiplexer/router products, references are made to nodes, bays, slots and port numbers in the network. By convention, the addressing syntax used is *Node:Slot:Channel*, where *Node* is the Node ID, *Slot* refers to a logical grouping of ports, often on the chassis or a particular card and *Channel* refers to a specific port within a slot. This scheme is adapted to the physical arrangement of each unit.

The following figure shows a single route configured to use an IP aggregate whose description is 'ToNode1'.

Name	Node	Slot	Chan	Agg	Connect Using	Alternate
ToNode1	1	ANY	ANY	IP	ToNode1	

Figure 6 Routing menu

If you are using the M&C or console port, rather than the web interface, you will be able to tell that the aggregate IP connection is active when the 'Agg Status' (top left of the **Routing menu**) displays 'Agg Status ToNode1 up'.

## 5 Keepalive/Clocking implications

Clock reference update packets are sent across the IP aggregate every 10 seconds. If an IP aggregate does not see one of these clocking update packets for 30 seconds the IP aggregate is declared as inactive/down.



## 6 Bandwidth calculations

The required bandwidth is dependant on several factors, which you are able to change. The values presented here are for reference only.

The 'Mux Delay' parameter specifies how long the system holds on to a packet destined for the IP aggregate, in milliseconds. If another packet destined for the same IP aggregate arrives within this period then it is tagged on to the existing packet, thus reducing overheads.

As long as the total Vocality payload will fit into the UDP payload, then the following rule of thumb may be used:

$$\text{Max bandwidth required(kbps)} = \frac{((255 \times \text{Mpps}) + (\text{No. tribs} \times 1600))}{1000} + \text{Total user data rate(kbps)}$$

where:

$$\text{Mpps} = \text{Max packets per second} = \frac{1000}{\text{Mux Delay (ms)}}$$

*No. tribs* = number of tributaries routed over the IP aggregate link, for example voice and data channels

*Total user data rate* = sum of all tributaries routed over the IP aggregate in kbps

The following table contains bandwidth requirements based on the above. The caveat still exists: By use of a buffer, the network access device will be expected to handle any instantaneous IP packet throughput that momentarily exceeds the CIR.

Codec	Mux Delay	No. Tribs	BW kbps	No. Tribs	BW kbps
G.723.1 (5.3k)	20	1	19.1	2	25.5
G.723.1 (6.3k)	20	1	20.2	2	27.6
G.729A (8k)	20	1	22.4	2	32.0
Netcode (8k)	20	1	22.4	2	32.0
Netcode (9.6k)	20	1	24.0	2	35.2

**Table 1-1 Approximate bandwidth requirements**

For real networks, a particular configuration may have an impact on the values actually achieved.

## 7 About Application Notes

Application Notes are intended as a supplement to, rather than a substitute for, your User Manual. Should you have queries which are not answered by our current documentation, your local Vocality support team would be happy to hear from you.

E-mail [support@vocality.com](mailto:support@vocality.com).