# **Veritas Cluster Server** – GAB/LLT basics

The cluster configuration is shared between all nodes in the cluster. This means not only the resources, but also the state of the resources. This implies that there must be some form of communication between the nodes in a cluster.

In general, communication on the internet happens via TCP/IP. That is, IP is used to address and transport the packets, and TCP is the part that actually contains the "messages" that needs to be carried. TCP/IP is not fast enough for cluster communications ! There are several reasons, but mainly because TCP has a self-correcting, connection-orientated nature.

So what transport does Veritas Cluster Server use ? And what are the "messages" carried around? This is where LLT and GAB come in. Basically, LLT is the transport protocol and GAB is the "message". LLT was written by Veritas because other transports were too slow and there was not enough control over it. LLT "talks" directly to the DLPI interfaces of the network layers. This enables LLT to send messages really fast. LLT is also responsible for the heartbeats between nodes in the cluster.

GAB is used to carry the state of the cluster, the configuration of the cluster and also makes sure that the correct membership is maintained. Membership comes into play with products like RAC and Veritas Cluster Volume Manager (CVM).

So when will which kind of message be sent by GAB ?
When the nodes in a cluster starts up, 1 node is selected to read the configuration from disk. (This is normally the first node to start). Once it has read the configuration from disk, it keeps it in memory and it will then also start getting the states of resources in the cluster (well on the single machine that starts). You can specify GAB not to start, unless a certain amount of members (or nodes) are present (this is specified by the "`-n`" option for "`gabconfig -c`".

The machine reads the configuration, keeps it in memory, and then as soon as any other machine starts (or joins the cluster), the configuration is passed to that machine (via GAB messages). The joining machine will then also go and find out what the state of resources are (on that machine) and report them back to the rest of the cluster (yep, GAB again). The state of resources are communicated regularly to other nodes in the cluster.

Like TCP, GAB also have different ports. These ports are used by different programs to "talk" to GAB. GAB to GAB (thus the communications between nodes in the cluster) happens on port "`a`".

HAD (the main VCS program that runs), actually does all the monitoring (well it tells Agents to monitor), and then the state of resources should be communicated to GAB (so that GAB can tell the rest of the nodes). The "`had`" process "talks" to GAB on port "`h`".

So, in a VCS cluster, you should always see GAB ports "`a`" and "`h`".

GAB also has other ports available:

- Port "`b`" is used for SCSI III fencing (Fencing is a whole new chapter).
- Port "`d`" is used by Oracle RAC (Well actually ODM)
- Port "`f`" is used by `fsckd` (part of the Veritas Cluster File System)
- Port "`o`" is used by Oracle RAC (cache fusion)
- Port "`q`" is used by the Veritas Cluster File System Quick Log
- Port "`u`" is an exclusive port to serialize joiners to Cluster Volume Manager. Any node that wants to join the CVM, will try to get port "`u`" exclusively, and then once it has joined the cluster, it will let go of port "`u`" again. So, in a normal situation (where nodes have joined), you should not see port "`u`"
- Port "`v`" is part of CVM. It is opened after port "`u`"
- Port "`w`" is also used in CVM.