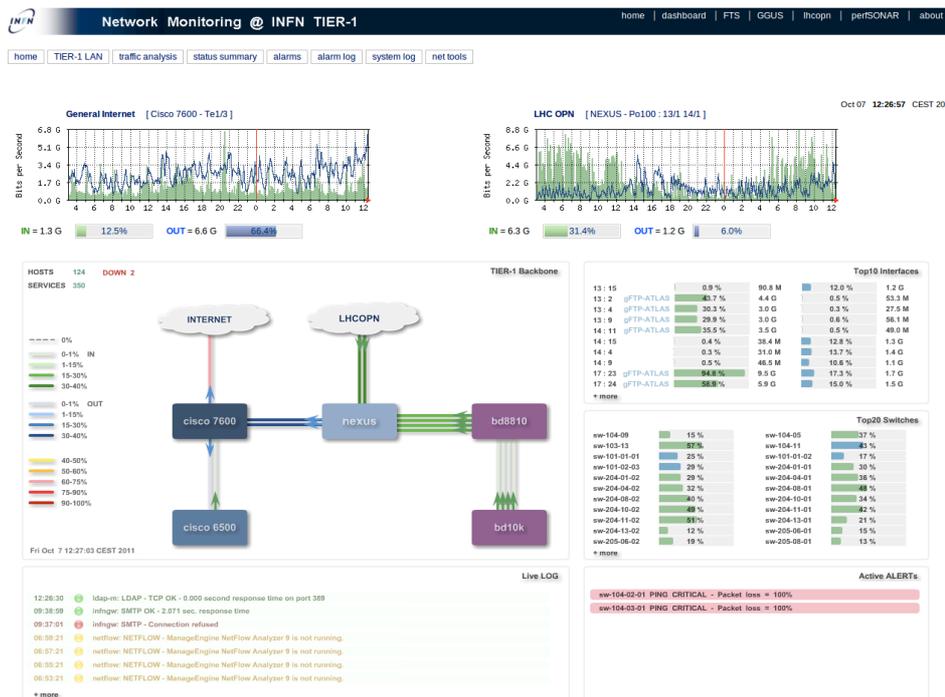




THE NETBOARD NETWORK MONITORING TOOLS INTEGRATION

The **NetBoard** is a network monitoring toolkit developed at INFN-CNAF. The basic idea is to integrate several monitoring tools in a single software system that works fine in a multi-vendor network environment. Moreover, in a complex data center, such as an LHC Tier-1, it is fundamental to have in a single "place" the overall status of the entire network "at a glance", either to minimize the reaction times of system engineers in case of errors, or to discover abnormal and unwanted behaviors.

In particular, the **NetBoard** is able to install and auto-configure all tools needed for monitoring, and to build dynamically the entire network map too, both via network devices discovery mechanism and via configuration file. In this way, The **NetBoard** is able to activate different types of sensors and checks according to the equipment vendor specifications. Finally the NetBoard web interface integrates in a single web page the most important informations coming from all network monitoring tools, giving a centralized and "effective" view of entire monitored IT infrastructure. Detailed status information of all devices are available too.



MRTG (Multi Router Traffic Grapher) is responsible for collecting the usage statistics of the bandwidth of all devices on the network. It uses SNMP to read, log and graph the traffic counters of every interface of all network devices. Thanks to the counters logged by MRTG, it has been possible to develop a kind of **LoadMap**, a graphical representation (based on color code and progress bars) of the load level of the uplinks of all network devices. In this way it's easy to understand where are connected the servers that are consuming the bandwidth, as well as to identify possible bottlenecks.

It can't be possible to think about a Data Center without an **Alert System**. System engineers have to know the "health status" of the network at every time and need to be immediately notified as soon as the trouble happens, in order to reduce downtimes. **Nagios** has been integrated in the NetBoard as alert system, because of its "stability", as well as for its features: monitoring of services, device metrics, etc.; alert notification via e-mail and SMS and escalation; event handlers, etc.

Alongside Nagios, **Arpwatch** has been integrated in NetBoard. It is used to keep track for [ethernet, ipaddress] pairings. Its textual database is always up-to-date because it uses pcap to listen for ARP packets on ethernet interfaces configured in trunk mode, in order to work with all vlans defined on network. It logs and report via e-mail all **new stations** that "appear" on network, if a station **change** ip address, or if there are two stations with the same ip address due to a misconfiguration (**flip-flop**). Furthermore, it is useful to discover where an ip address (or hostname) is plugged, just reading the **forwarding database** of a network device via SNMP.

