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Broadcast Network Management System R&S® NETLINK-C

Fully meets the requirements of broadcast network operator

- ◆ Service-oriented network management
 - Reports on quality of service (QoS)
 - Availability of components and systems
 - Fulfillment of service level agreements (SLA)
- ◆ Remote control of components
- ◆ Device configuration management
- ◆ Ticketing and alarm tools
- ◆ Seamless migration from existing management systems
 - Easy integration of non-SNMP components



ROHDE & SCHWARZ

Introduction

R&S®NETLINK-C is a network management system specifically designed to meet broadcast network requirements. It monitors broadcast networks and their components, records and manages network events, and forwards these events as required to different recipients such as maintenance staff, customer care centers, customers, etc.

R&S®NETLINK-C visualizes the data and states of network components for individual users, computes quality of service (QoS) data and provides interfaces for comprehensive reporting. All functions have been designed for object orientation (components view) and service orientation (programs, multiplexes).

The system thus enables network operators to monitor the functionality and availability of services. It also helps them operate and maintain their networks, plus manage service level agreements (SLA).

Standardized yet customized

Far from being an “off-the-shelf solution”, R&S®NETLINK-C provides comprehensive standard broadcast network management functionality. All customer-specific requirements for monitoring, event management, notification, visualization and reporting can be efficiently and economically implemented using this tool.

R&S®NETLINK-C implements both TCP/IP and SNMP, two standard protocols that are used throughout the world.



R&S®NETLINK-C can be seamlessly embedded in the OpenView family from Hewlett-Packard and uses components from this family such as the Network Node Manager. The R&S®NETLINK-C operator user interface is provided via a web server. Thus, no proprietary client software is needed, and the client end is platform-independent. R&S®NETLINK-C is operated using standard browsers or standard X terminals or X terminal emulations for administration.

R&S®NETLINK-C provides an extensive security infrastructure for implementing effective solutions. Since the security concept is tailored to customer needs, customized solutions can be created. These solutions seamlessly integrate into the customer’s existing infrastructure.

Remote consoles are connected either via internal networks (intranet, dedicated lines) or public networks (Internet). Security protocols such as VPN for web operation and SecureShell for X terminal operation can be used for connections via public networks. They can also be implemented via a metaframe server.

Platforms

R&S®NETLINK-C is available on HP UNIX platforms. Other platforms such as Solaris, Linux and Windows are available on request.

Key functions

Three-layer architecture

All R&S®NETLINK-C operations and representations are integrated in a three-layer architecture. R&S®NETLINK-C thus meets all requirements for viewing networks and their components. The three layers correspond to the layers for physical, logical and service-oriented objects.

This provides access to data and representations of the devices that are physically present (physical objects). These devices can be grouped into logical objects that can be used as a combination of several physical objects, for example. Service-oriented objects can be placed on top of physical and logical objects, thus defining which objects are covered by a specific service and the routing. Each object at each layer has its own data and representation.

Service-oriented topology

Service refers to a program (e.g. analog TV/radio program), a multiplex (e.g. DVB-T/DAB-T multiplex) or a data service (e.g. datacasting). Network operators and their customers are primarily interested in the functions and availability of services. This is why R&S®NETLINK-C provides a service-oriented view of broadcast networks and why it supports service-oriented functions for the following:

- ◆ Visualization
- ◆ Reporting
- ◆ QoS
- ◆ Event management
- ◆ Event correlation

Event processing

Events in R&S®NETLINK-C can be triggered by different sources:

- ◆ Traps (alarms) of connected devices/infrastructure
- ◆ Network discovery events (network modifications)
- ◆ Data collection events (polling of connected devices/infrastructure)

- ◆ Logical layer events (e.g. of virtual, physical objects or subsystems)
- ◆ Event correlation, both component-oriented and service-oriented correlation

The event manager receives the events from the various sources and transmits them to the event correlation function which, in turn, sends them back to the event manager or correlates events and/or generates new events that are returned to the event manager.

Quality of service

Data relevant to QoS and the associated device information are defined in the specification phase and also when new devices are added to the broadcast network. This data is mainly information about the state of the devices or their parts.

R&S®NETLINK-C supplements this information by adding attributes such as counters for transients. It is then possible to calculate and provide QoS data such as availability as a percent value as well as the uptime and downtime of a specific device.

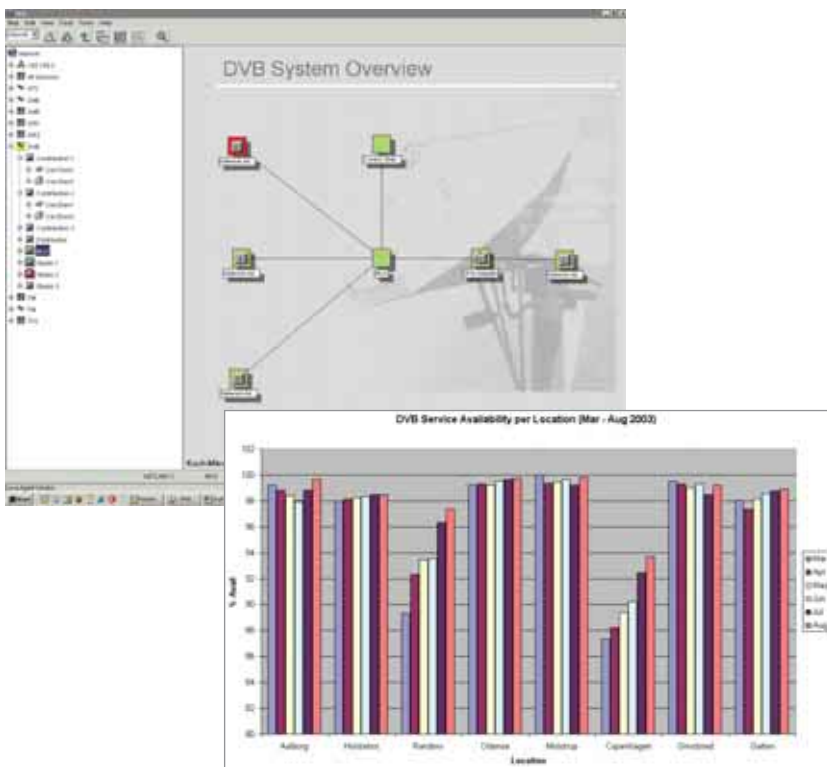
Each logical or service-oriented object derived from a physical object “inherits” the QoS information from the objects below it. R&S®NETLINK-C thus provides QoS information about all objects. From the network operator’s perspective, this information is specific to the individual devices (transmitters, multiplexers, etc) and defined services (programs, multiplexes).

Electronic or paper reports can be generated from the QoS data and then used as proof of QoS or to manage SLAs.

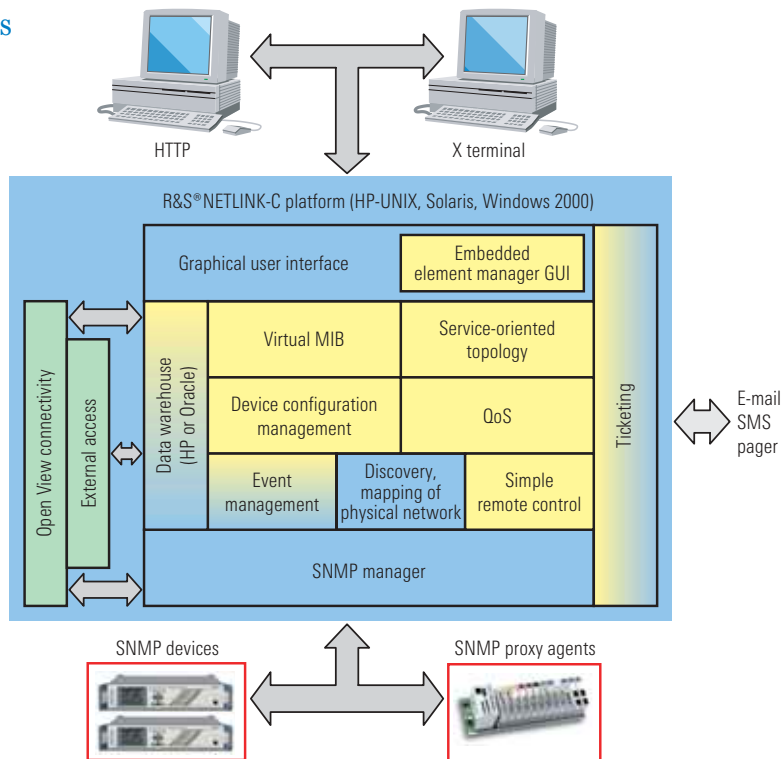
Virtual MIB

Virtual MIB is an internal R&S®NETLINK-C function that does the following:

- ◆ Visualizing devices connected to an SNMP proxy agent
- ◆ Creating virtual subsystems from complex devices as a basis for service orientation



Overview of functions



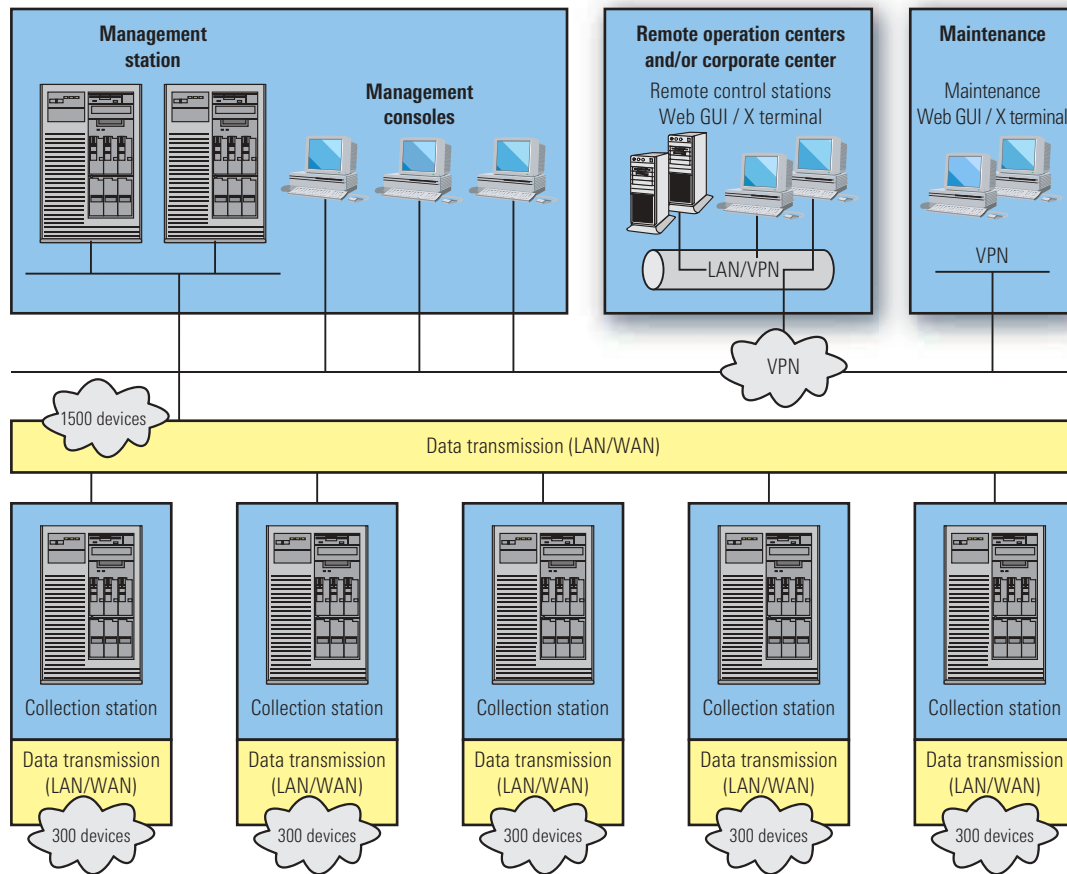
User interface	Easy user-specific operation via web browser or X terminal; easy integration of element managers.
Service-oriented topology	Service orientation covering visualization, event management and QoS data.
QoS	Availability, time on air, delays and downtimes of components and services. Basis for proof in SLA management.
Virtual MIB	Dividing and allocating the information of the devices connected via an SNMP proxy agent. Creation of logical virtual device images, generated from complex devices (e.g. dividing of multichannel devices into channels). The virtual MIB is the basis for the service-oriented approach of R&S NETLINK-C.
Device configuration management	Uploading and downloading of MIB device configurations, simplifying device replacement.
Remote control	Easy means of remote control via I/O systems (similar to SNMP proxy agents) or MIB direct write access.
SNMP manager	Standard SNMP manager of the Network Node Manager; counterpart of both the SNMP agents in the devices and the SNMP proxy agent.
Discovery, mapping of physical network	Standard functionality of the HP Network Node Manager.
Event management	Service-oriented event correlation and event management, based on the standard event management of the HP Network Node Manager.
Ticketing	Customized forwarding and acknowledgement of events to maintenance staff, help desks, customers, etc; company-specific escalation strategies, priority management, staff planning and communications via telephone, pager, SMS, e-mail and voice mail.
Data warehouse	Database containing all information about network and events; can also be exported to an external database (Oracle, others on request), thus making additional functions available. Using an external database such as Oracle is especially beneficial when reporting requirements are complex.

Complex distributed systems

R&S NETLINK-C can also be distributed across several sites for complex applications and can be operated as a management station, a collection station, or both.

Management station	Corresponds to normal operation as a control center with or without collection stations. R&S NETLINK-C operates as a frontend data collector and can preprocess data (filtering, event correlation) if required. In large systems, collection stations reduce the load on the management station and provide additional security and lower network load (e.g. in the case of a WAN with narrow bandwidths). R&S NETLINK-C operates both as a collection station for the main management station and as a management station in the local monitoring network. Such a constellation is also useful for regional centers that have their own administration and maintenance.
Collection station	
Dual role station	

System architecture



Control and operation center

This is where the R&S® NETLINK-C management station is situated. Depending on the availability requirements, R&S® NETLINK-C can be operated on a simple server system, a RAID server system, a failover system or a (distributed) cluster system. The management console is usually situated at this site but can easily be connected elsewhere via LAN or a second one can be set up.

Remote operation center

Remote consoles can be operated at any site. All they need is a network connection/modem and an installed browser. The remote consoles are connected to the management station via intranet or public networks (Internet). Security protocols such as VPN can be used for connections via public

networks. Or the remote consoles can be connected via a metaframe server, which is especially useful for connections via public networks with narrow bandwidths.

Maintenance

In addition to stationary remote consoles, e.g. at home, maintenance staff can also use mobile remote consoles. The volume of information can be reduced to key information, permitting access via narrow-bandwidth connections.

Data transmission

The sites to be monitored are connected to the management station via LAN/WAN. If possible, sites should be set up with Ethernet (TCP/IP). Otherwise, dial-up connections (ISDN, analog, GSM) can be used.

Sites

SNMP-compatible devices can be connected at the sites. Non-SNMP-compatible devices and infrastructure are connected via an SNMP proxy agent. The devices can be parameterized using their specific element manager either via the local network or directly via the device interfaces.

It is possible to monitor items such as the following:

- ◆ Broadcast equipment (transmitters, re-multiplexers, etc)
- ◆ Infrastructure (climate, break-in, fire, etc)
- ◆ Test equipment (test receivers, analyzers, etc)



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