Alcatel-Lucent 5620

SERVICE AWARE MANAGER

SYSTEM ARCHITECTURE GUIDE
Alcatel-Lucent assumes no responsibility for the accuracy of the information presented, which is subject to change without notice.

Alcatel, Lucent, Alcatel-Lucent, the Alcatel-Lucent logo, lightRadio, and TiMetra are registered trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners.

Copyright 2014 Alcatel-Lucent.
All rights reserved.

Disclaimers
Alcatel-Lucent products are intended for commercial uses. Without the appropriate network design engineering, they must not be sold, licensed or otherwise distributed for use in any hazardous environments requiring fail-safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life-support machines, or weapons systems, in which the failure of products could lead directly to death, personal injury, or severe physical or environmental damage. The customer hereby agrees that the use, sale, license or other distribution of the products for any such application without the prior written consent of Alcatel-Lucent, shall be at the customer's sole risk. The customer hereby agrees to defend and hold Alcatel-Lucent harmless from any claims for loss, cost, damage, expense or liability that may arise out of or in connection with the use, sale, license or other distribution of the products in such applications.

This document may contain information regarding the use and installation of non-Alcatel-Lucent products. Please note that this information is provided as a courtesy to assist you. While Alcatel-Lucent tries to ensure that this information accurately reflects information provided by the supplier, please refer to the materials provided with any non-Alcatel-Lucent product and contact the supplier for confirmation. Alcatel-Lucent assumes no responsibility or liability for incorrect or incomplete information provided about non-Alcatel-Lucent products.

However, this does not constitute a representation or warranty. The warranties provided for Alcatel-Lucent products, if any, are set forth in contractual documentation entered into by Alcatel-Lucent and its customers.

This document was originally written in English. If there is any conflict or inconsistency between the English version and any other version of a document, the English version shall prevail.
## Contents

1 — 5620 SAM system architecture 1-1

1.1 5620 SAM system architecture overview ............................................ 1-2
      5620 SAM functions .................................................................. 1-2
      Main architecture features ....................................................... 1-2

1.2 Network management functions ...................................................... 1-2
      Service management .............................................................. 1-2
      Accounting ............................................................................ 1-3
      Equipment management .......................................................... 1-3
      Performance management ........................................................ 1-3
      Fault management ................................................................... 1-3

1.3 System components..................................................................... 1-3
      Main servers........................................................................... 1-3
      Auxiliary servers...................................................................... 1-4
      5620 SAM databases................................................................ 1-4
      Auxiliary database clusters ....................................................... 1-4
      Single-user GUI clients ............................................................... 1-4
      Client delegate servers ............................................................. 1-4
      OSS clients ............................................................................ 1-4
      Subcomponents ....................................................................... 1-5

1.4 Component communication ........................................................... 1-5
      Servers and managed NEs........................................................... 1-6
      Main server and clients ............................................................. 1-6
      Main server and 5620 SAM database .......................................... 1-7
      Main server and auxiliary servers .............................................. 1-7
      5620 SAM integration with external systems ............................. 1-7

1.5 System structure ........................................................................ 1-7
      Framework ............................................................................. 1-7
      Server data model ................................................................... 1-9
      Distributed server architecture ................................................. 1-9
Contents

1.6 Security .................................................................................. 1-10
   Session management ................................................................... 1-11
   Network transport security ..................................................... 1-12
1.7 Fault tolerance .......................................................................... 1-12
   Main server and database redundancy ...................................... 1-13
1.8 Standards compliance .............................................................. 1-14
1 — 5620 SAM system architecture

1.1 5620 SAM system architecture overview 1-2
1.2 Network management functions 1-2
1.3 System components 1-3
1.4 Component communication 1-5
1.5 System structure 1-7
1.6 Security 1-10
1.7 Fault tolerance 1-12
1.8 Standards compliance 1-14
1.1 5620 SAM system architecture overview

The 5620 SAM is a network management system that simplifies routine operations and allows the bulk provisioning of network objects. The system is designed using industry standards such as Java, Java EE, XML/SOAP, WebDAV, and 3GPP. The 5620 SAM uses open-standard interfaces that allow the system to interoperate with a variety of other network monitoring and management systems.

5620 SAM functions

The 5620 SAM network management functions include the following:

- service and routing configuration using distributed policies and profiles
- equipment, service, and customer inventory reporting with filtered views
- network performance and accounting statistics collection
- hierarchical alarm correlation between objects
- OSS interfaces that provide access to 5620 SAM functions from other systems

Main architecture features

The main features of the 5620 SAM system architecture include the following.

- the use of open standards to promote interaction with other systems
- distributed resources that spread the processing load across multiple components and efficiently execute network management tasks
- a multi-layer design model with functions in separate modules that interact with OEM products to accommodate increasing network growth and complexity
- web services that effectively export XML interfaces over the Internet to permit access to remote components such as web portals, and allow third-party vendors to create customized entry points for 5620 SAM functions
- component redundancy that provides a high degree of fault tolerance

1.2 Network management functions

The 5620 SAM provides comprehensive network access for operators based on role-based scopes of command and spans of control over types of network objects.

The main and auxiliary servers collect data from managed NEs and collate the data for accounting, performance monitoring, troubleshooting, inventory, and fault management. A main server deploys operator commands to the network and performs functions such as NE discovery and regular backups of the 5620 SAM database, auxiliary database cluster, and NE configurations.

Service management

The 5620 SAM service management functions allow network operators to provision VLL, VLAN, VPLS, IES, VPRN and mirror services for customers. Each service can be monitored to provide performance, usage, and fault information.
Accounting

The 5620 SAM collects accounting statistics from managed NEs to create billing records and for traffic analysis. The statistics are transferred to the 5620 SAM main and auxiliary servers using FTP or SCP.

Equipment management

The 5620 SAM maintains an equipment data model and deploys configuration updates to the managed NEs. For example, when a 5620 SAM operator adds a card to an NE, the data model is updated to include the card, and the card provisioning and configuration commands are sent to the NE. New NEs can be discovered at operator request, or automatically. A newly discovered NE is added to the data model.

Performance management

The 5620 SAM can monitor services and network resources using performance statistics, OAM diagnostic tools, and data validation, and raises alarms when appropriate.

- The 5620 SAM collects performance statistics via polls of NEs, which use SNMP to upload the data from local MIBs.
- The 5620 SAM has a comprehensive suite of OAM tools for monitoring service, NE, and transport availability and performance. You can run tests before service activation to ensure that a service functions correctly after activation.
- The 5620 SAM regularly compares the configuration information on managed NEs with the information in the 5620 SAM database to ensure synchronization.

Fault management

The 5620 SAM performs fault management in response to SNMP traps from NEs. A main server converts one or more traps to a status update and raises an alarm against an object, if appropriate. GUI clients use visual and auditory cues to alert an operator when an alarm is raised.

NEs send SNMP traps to notify the 5620 SAM of various conditions that include configuration changes, state changes, security breach attempts, and equipment faults. The traps are passed to OSS clients immediately if they are registered for a JMS event channel, or later when an OSS client polls the server.

1.3 System components

The following describe the main components of a 5620 SAM system.

Main servers

A main server is the central Java-based network-management processing engine. A main server runs on a Solaris x86 or RHEL platform, and includes third-party components such as an application server, JMS server, web server, protocol stack set, and database adapter. Some functions, such as statistics collection, can be distributed across optional auxiliary servers.
Auxiliary servers

An auxiliary server, like a main server, is a Java-based processing engine that runs on a Solaris x86 or RHEL platform, but is an optional, scalable component that extends the system ability to perform statistics or call-trace data collection. An auxiliary server is controlled by a main server, and collects data directly from NEs for storage in the 5620 SAM database, or in an auxiliary database cluster.

5620 SAM databases

A 5620 SAM database is a customized relational database that provides persistent storage and serves as a central network data repository. A database can be collocated on the same station as a 5620 SAM main server, or on a separate station. 5620 SAM database deployment is supported on a RHEL or Solaris x86 platform.

Auxiliary database clusters

An auxiliary database is an optional, scalable component that effectively expands the 5620 SAM database throughput and storage for demanding operations such as statistics collection. Auxiliary databases are deployed in one cluster of three databases on separate stations. The cluster members comprise a distributed database, which provides robust fault tolerance. Auxiliary database deployment is supported only on a RHEL platform.

Single-user GUI clients

A single-user GUI client is a Java-based graphical interface for network operators. You can deploy single-user GUI clients on multiple platforms; the client platform type does not need to match the platform type of any other 5620 SAM component.

Client delegate servers

A client delegate server supports multiple simultaneous local and remote GUI client sessions using one client software deployment on one station. A client delegate server also supports third-party remote access tools such as Citrix gateways. Client delegate server deployment is supported on a RHEL or Solaris x86 platform.

OSS clients

An OSS client is a software application that you create and implement to automate GUI client tasks, or to retrieve data for post-processing, for example, rolling up statistics data into a billing application. OSS clients may be as diverse as simple CLI scripts and third-party applications. An OSS client is platform-independent, because only Java messages are exchanged with the 5620 SAM.

The 5620 SAM supports the following OSS client types:

- XML/SOAP clients that use the XML OSS interface to perform general 5620 SAM management functions
- 3GPP OSS clients that use either a CORBA or XML/SOAP 3GPP OSS interface to perform LTE management functions

See the 5620 SAM XML OSS Interface Developer Guide and the 5620 SAM LTE OSS Interface Developer Guide for more information.
Subcomponents

All licensed subcomponents are listed in the path/nms/distribution/licenses directory on a main server, where path is the installation location, typically /opt/5620sam/server. The following is a partial list of licensed subcomponents. See the README file that accompanies a subcomponent license for more information.

- Apache Software Foundation log4j
- Oracle JDK, Java, and JRE
- Oracle Enterprise Edition
- Zero G Software InstallAnywhere
- yWorks yFile 2.6.1
- JBoss Application Server
- AXL Radius and TACACS+
- SL Corp SL-GMS
- Sourceforge ganymed-ssh2

1.4 Component communication

The 5620 SAM component interfaces use industry-standard protocols for communication between servers, databases, NEs, and clients, as shown in Figure 1-1.

Figure 1-1 5620 SAM component communication
Servers and managed NEs

Main and auxiliary servers send messages to the managed network in the form of SNMP, FTP, secure FTP, and SCP commands. A 5620 SAM main server also sends CLI commands using Telnet or SSH.

- A main server uses SNMP to monitor and manage network performance, and to identify network problems. Main servers deploy configuration changes to NEs using SNMP. Auxiliary servers poll MIB performance statistics on the NEs, and collect call-trace data for RAN. The NEs use asynchronous SNMP messages called traps to notify the 5620 SAM of events.
- The CLI of a managed NE is accessible from the client GUI using Telnet or SSH.
- FTP and SCP are transport-layer protocols for transferring files between systems. The 5620 SAM uses the protocols to back up NE configuration data, collect NE accounting statistics, and download software to NEs.
- JMS is a subscription service that allows clients to receive event messages about the state of the managed network. JMS runs in a dedicated JVM on a main server.

Main server and clients

Client interfaces provide access to the managed network through a main server. A GUI client uses Java session bean invocations and sends requests to view or change network objects. An XML OSS client uses XML/SOAP messages, and a 3GPP OSS client uses CORBA- or XML/SOAP-based IRPs. Each type of client communication is performed over an HTTP or HTTPS connection.

A main server communicates with clients in the following ways.

- XML OSS client software developers create requests for processing by the main server. Schema files provide the XML interface definitions for data objects. The schema files package related objects together, and describe the attributes and methods of each object. The JMS interface is also available for XML messaging. See the 5620 SAM XML OSS Interface Developer Guide for more information about the contents of the schema files and the messaging between XML OSS clients and a 5620 SAM main server.
- 3GPP OSS client software developers create CORBA or SOAP/XML requests for processing by a 5620 SAM main server. IRPs provide the interface definitions for data objects. See the 5620 SAM 3GPP OSS Interface Developer Guide for more information about the messaging between 3GPP OSS clients and a 5620 SAM main server.
- The 5620 SAM GUI clients send requests to the server EJB session beans using Java RMI.
- The 5620 SAM GUI auto-client update function uses HTTP or HTTPS for client software updates and file downloads.
- The 5620 SAM application clients use HTTP or HTTPS to communicate with the web service on a 5620 SAM main server.
- The JMS and the XML publisher service run on the same physical station as a main server, but in separate JVMs to support multiple concurrent client connections.
• The GUI and OSS clients use JMS channels to receive real-time network event information from a main server. Each client must register a subscription to set up a JMS channel. The available event types include:
  • managed network fault notifications
  • managed network configuration changes
  • server activity-switch notifications
  • 5620 SAM component connectivity errors
• A web-based GUI client communicates through a web browser using JNLP.

Main server and 5620 SAM database

A main server communicates with a 5620 SAM database using a JDBC session over TCP. JDBC is a Java API for interworking with SQL relational databases.

Main server and auxiliary servers

A main server includes a mechanism for sending requests to auxiliary servers. A main-server functional area that uses the mechanism, for example, a statistics-collection scheduler, performs load balancing to equally distribute the requests among the available auxiliary servers. An auxiliary server notifies the main server after it finishes processing a request. If the main server fails to send a request or all available auxiliary servers are unresponsive to a request, the main server raises an alarm.

5620 SAM integration with external systems

The 5620 SAM can be integrated with an external network-management system such as the 5620 NM. During 5620 SAM system installation, you can configure navigation from an external system for additional network monitoring. See the 5620 SAM Integration Guide and 5620 SAM | 5650 CPAM Installation and Upgrade Guide for more information.

1.5 System structure

A 5620 SAM system has a readily adaptable, modular structure that incorporates a relational data model and employs distributed processing.

Framework

The functional elements of a 5620 SAM system are created using Alcatel-Lucent and non-Alcatel-Lucent software, and logically organized in a framework that has the following layers:
  • resource
  • integration
  • business
  • presentation
  • client
Figure 1-2 shows the multi-layer model and the elements in each layer.

**Resource layer**

The resource layer includes the network of managed NEs, the 5620 SAM database, and optionally, an auxiliary database cluster. The databases store objects such as NE configurations, statistics, and customer services.

**Integration layer**

The integration layer buffers resource-layer elements from the business layer. This layer contains the mediators, which communicate with equipment in the managed network, and the database adapter. The mediator components translate messages from the business layer into the SNMP, FTP, secure FTP, and CLI commands that are sent to the managed network. Messages that are received from the network are processed by the mediator components and passed to the business layer. The database adapter translates business logic requests into JDBC commands, and translates JDBC responses into Java business model objects.
Business layer

The business layer contains the logic and data model for 5620 SAM functions. The business logic processes client requests, SNMP traps from managed NEs, and internal server events, and performs the appropriate actions on the managed network, clients, and data model, which maintains information about network objects and their relationships. To support the business layer, an application server provides Java EE services.

Presentation layer

The presentation layer buffers the application logic from the client layer. This layer contains several components. The web server receives SOAP/XML messages from OSS clients and passes them to the business layer. The application server handles EJB method invocations received from the GUI clients and returns the responses generated by the business-layer logic. The application server also forwards JMS event notification messages from the business layer to GUI and OSS clients.

Client layer

The client layer comprises the GUI, OSS, and web clients. The GUI client Java VM sends EJB RMI to a main server. The OSS clients send XML/SOAP or CORBA messages to a main server. The web-based clients use JNLP for portal interfaces.

Server data model

The server data model represents the physical and logical elements of the network, such as equipment, customers, services, and statistics. The model also describes the relationships between objects, so allows operators to perform high-level operations that are propagated to child objects, as required. The object associations enable effective central management of large, complex networks.

The 5620 SAM maintains in the data model a representation of the current managed network state, and incorporates changes as they occur. Changes that are initiated by NEs include event notifications such as fault traps and state changes; changes that are initiated by clients include object creation, deletion, and configuration updates. The changes are applied to the model, saved in the 5620 SAM database, deployed to the network as required, and reported to clients.

Distributed server architecture

The 5620 SAM server functions can be distributed across multiple physical platforms in a standalone or redundant configuration. A main server and one or more auxiliary servers in the same 5620 SAM domain define a 5620 SAM server cluster. A redundant 5620 SAM system has two clusters—one for each main server. The auxiliary servers are members of only the cluster that contains the currently active main server. When the main servers in a redundant deployment change roles, for example, after a server activity switch, the auxiliary servers leave the current cluster and join the cluster that contains the new primary main server.

The main server in a cluster is the network-management engine that processes GUI and OSS client requests and monitors the network elements. It also directs the operation of the auxiliary servers and distributes the processing load as required. The distributed architecture is not visible to the GUI and OSS clients, which interact only with the currently active main server.
A main server sends new or updated operating information such as the 5620 SAM license capacity, redundancy status, or database credentials, to each auxiliary server as the information becomes available.

### 1.6 Security

A distributed system such as the 5620 SAM requires security at the session and other communication layers. A GUI or OSS client must provide user credentials for access to the 5620 SAM. You can protect the session credentials and messages using mechanisms and protocols that include the following:

- HTTPS, as the application-layer transport for OSS clients
- Telnet, SSH, SCP, and SNMPv3 with USM or VACM, at the application layer for communication between a main server and the managed network
- SSL, at the presentation layer, between a main server and the GUI or OSS clients, and between the primary and standby main servers in a redundant deployment
- NAT, at the network layer, between the following:
  - main server and single-user client or client delegate server
  - main or auxiliary server and OSS client
  - main or auxiliary server and managed network
- IP validation, at the network layer, between a main server and database

Figure 1-3 shows the 5620 SAM components and the available security mechanisms.
Session management

Effective session management requires authentication, authorization, and accounting, or AAA functions. Authentication is the verification of a set of user credentials. Authorization is the assignment of access privileges to users. Accounting is the recording of user actions. A 5620 SAM operator can configure AAA functions using the local 5620 SAM security mechanisms, a third-party authentication server, or a combination.

- Local 5620 SAM authentication is performed using a local database of users and a local security scheme.
- Supported third-party authentication servers are RADIUS, TACACS+, SAM-L, and CSA. These servers run on separate platforms, and have separate user lists and administration processes.

5620 SAM user accounts consist of a user name, password, and an associated user group, scope of command, and span of control. User groups define user authorization levels, and control the level of access to objects such as equipment, customers, services, and alarms. A system administrator can limit the type of user access per managed NE; for example, allowing FTP access but denying console, Telnet, or SNMP access.

Client sessions

All client sessions require authentication.

- The client GUI EJB sessions are secured by the session username and password.
- Each OSS client message is authenticated using cached information from an authorization server.
- JMS messages are secured by the user name and password sent during the JMS session registration.

Database sessions

The 5620 SAM database is accessible through a main or auxiliary server connection that is secured by a username and password. After each database update in response to a client request, the client activity log records the request information, which includes the name of the associated 5620 SAM user.

Secure communication between a main server and a 5620 SAM database is available in the form of IP-address validation, which is configurable during 5620 SAM system installation or upgrade.

Managed NE sessions

A 5620 SAM server opens CLI, FTP, SFTP and SCP sessions on managed NEs. A managed NE uses a local security database, or a third-party service such as RADIUS or TACACS+ to perform AAA security functions.

SNMPv3 message authentication and authorization are handled by the USM and VACM mechanisms, which define the user authorization permissions. Older SNMP versions are authenticated using community strings. Each SNMP message is individually authenticated.
Network transport security

Transport-layer security is available to the network protocols that carry messages between 5620 SAM components.

Main server and clients

Network communication between a main server and clients is performed using XML/SOAP, EJB, or JMS messages.

- OSS clients use HTTPS to transport XML/SOAP messages when SSL is enabled in a 5620 SAM system; otherwise, the transport is HTTP.
- The GUI clients use the EJB interface, which is secured using SSL.
- JMS, which is used by GUI and OSS clients, is secured using SSL.
- In a redundant deployment, the standby main server acts as a client of the primary main server, which is secured using SSL.

Servers and managed NEs

A managed NE communicates with a main or auxiliary server using SNMP, FTP, or SCP. When SNMPv3 is used, an SHA or MD5 authentication key is included in each message and checked against the shared encryption key.

SSH provides the security for a CLI session between a 5620 SAM GUI client and a managed NE.

RSA encryption is available for communication between auxiliary servers and managed NEs. Contact Alcatel-Lucent support for information.

Firewall support

The 5620 SAM supports firewalls on all server interfaces; for example, between a main server and the auxiliary servers and GUI or OSS clients, and between a main or auxiliary server and the managed network. See the 5620 SAM Planning Guide for firewall and reserved TCP port information.

1.7 Fault tolerance

Fault tolerance provides system reliability by maintaining availability in the event of a component failure. 5620 SAM fault tolerance includes high availability using component redundancy. Deploying redundant 5620 SAM hardware and software components ensures that there is no single point of 5620 SAM system failure.

Redundant physical network interfaces and points of network entry ensure that there is no single point of failure between the 5620 SAM system and the managed network. Redundant network paths, for example, in-band and out-of-band management, can help to prevent the isolation of a main server from the network in the event of a routing failure.
Main server and database redundancy

A redundant 5620 SAM system consists of a primary main server and an associated primary 5620 SAM database that actively manage the network, and a second server and database pair in standby mode. A 5620 SAM server and database pair can be collocated on one station or run on separate stations. Figure 1-4 shows a fully distributed, redundant 5620 SAM deployment.

See the 5620 SAM System Administrator Guide for more information about 5620 SAM redundancy.

Main server redundancy

5620 SAM main server redundancy is achieved through clustering technology provided by a JBOSS Java application server on each main server. The primary and standby main servers regularly poll each other to monitor availability. Traps from the managed network are always sent to both main servers in order to avoid delays in the event of a server activity switch.

If the primary server loses visibility of the standby server, it notifies the GUI clients. If the standby server loses visibility of the primary server, the standby server attempts to become the primary server by connecting to the primary database.
5620 SAM database redundancy

5620 SAM database redundancy uses Oracle Data Guard Replication in real-time apply mode to keep the standby database synchronized with data changes in the primary database. The supported fault-recovery operations are database switchovers and database failovers. A switchover is a manual operation that switches the primary and standby database roles. A failover is an automatic operation that forces the standby database to become the primary database when the primary database fails or becomes unavailable.

The primary main server polls each database to check the availability. If the primary or standby database is unavailable, the main server notifies the GUI clients. If both main servers lose contact with the primary database, a failover occurs and the standby database becomes the primary database.

Auxiliary database clusters

An auxiliary database cluster is a standalone entity; a 5620 SAM system supports one cluster of three auxiliary databases that must be directly accessible to each main and auxiliary server in the system. Fault tolerance is inherent in the distributed nature of the auxiliary database among the cluster members.

Note — You cannot include an auxiliary database cluster in a geographically redundant 5620 SAM system. See the 5620 SAM Planning Guide for information about the tolerated network latency between 5620 SAM components.

Auxiliary servers and 5620 SAM redundancy

Auxiliary servers are passively redundant. They do not cause or initiate main server or database redundancy activities, but if a Preferred auxiliary server ceases to respond to requests from the primary main server and a Reserved auxiliary server is available, the main server directs the current and subsequent requests to the Reserved auxiliary server until the Preferred auxiliary server is again available.

An auxiliary server communicates only with the current primary server and database. After a 5620 SAM redundancy activity such as a database failover, the primary main server directs the auxiliary servers to stop communicating with the former primary component and to begin communicating with the new primary component.

1.8 Standards compliance

Table 1-1 describes the 5620 SAM standards compliance.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3GPP</td>
<td>3rd Generation Partnership Project IRPs for CORBA R8 and SOAP/XML R8 Solution Sets</td>
</tr>
<tr>
<td>draft-grant-tacacs-02.txt</td>
<td>TACACS+ client</td>
</tr>
<tr>
<td>draft-ylonen-ssh-protocol-00.txt</td>
<td>SSH</td>
</tr>
</tbody>
</table>

(1 of 2)
<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EJB 2.1</td>
<td>Java EE Enterprise Java Session Bean</td>
</tr>
<tr>
<td>HTML5</td>
<td>HyperText Markup Language version 5 for 5620 SAM web applications (<a href="http://www.w3.org/TR/html5/">http://www.w3.org/TR/html5/</a>)</td>
</tr>
<tr>
<td>HTTP(S)</td>
<td>HyperText Transfer Protocol (Secure) version 1.1</td>
</tr>
<tr>
<td>ITU-T X.721</td>
<td>SMI</td>
</tr>
<tr>
<td>ITU-T X.734</td>
<td>Event report management function</td>
</tr>
<tr>
<td>Java SE</td>
<td>Java Standard Edition version 7</td>
</tr>
<tr>
<td>JBOSS</td>
<td>Java Bean Open Source Software version 5.1.2</td>
</tr>
<tr>
<td>JMS</td>
<td>Java Message Service version 1.1</td>
</tr>
<tr>
<td>JSON (JavaScript Object Notation)</td>
<td>ECMA-404 JSON Data Interchange Format</td>
</tr>
<tr>
<td>JS/ECMAScript 5</td>
<td>ECMA-262 ECMAScript Language Specification</td>
</tr>
<tr>
<td>M.3100/3120</td>
<td>Equipment and connection models</td>
</tr>
<tr>
<td>MTOSI</td>
<td>Compliance of generic network objects, inventory retrieval, and JMS over XML</td>
</tr>
<tr>
<td>RFC 0959</td>
<td>FTP</td>
</tr>
<tr>
<td>RFC 1213</td>
<td>SNMPv1</td>
</tr>
<tr>
<td>RFC 1738</td>
<td>Uniform Resource Locators (URL)</td>
</tr>
<tr>
<td>RFC 2138</td>
<td>RADIUS client 2618</td>
</tr>
<tr>
<td>RFC 3411-3415</td>
<td>SNMPv3</td>
</tr>
<tr>
<td>RFC 3416</td>
<td>SNMPv2c</td>
</tr>
<tr>
<td>RFC 6241</td>
<td>Network Configuration Protocol (NETCONF)</td>
</tr>
<tr>
<td>SAML</td>
<td>SAM-L 1.1</td>
</tr>
<tr>
<td>SOAP</td>
<td>W3C SOAP 1.2</td>
</tr>
<tr>
<td>TMF 509/613</td>
<td>Network connectivity model</td>
</tr>
<tr>
<td>XML</td>
<td>W3C XML 1.0</td>
</tr>
<tr>
<td>XML</td>
<td>W3C Namespaces in XML</td>
</tr>
<tr>
<td>XML</td>
<td>W3C XML schemas</td>
</tr>
</tbody>
</table>

(2 of 2)

Alcatel-Lucent considers the following standards in the 5620 SAM GUI design:

- Telcordia (Bell Core) GR-2914-CORE Sept. 98, *Human Factors Requirements for Equipment to Improve Network Integrity.*
- Telcordia (Bell Core) GR-826-CORE, June 1994, Issue 1, Section 10.2 of OTGR, *User Interface Generic Requirements for Supporting Network Element Operations.*
- ITU-T Recommendation Z.361 (02/99), Design guidelines for Human-Computer Interfaces (HCI) for the management of telecommunications networks.
- ETSI EG 201 204 v1.1.1 (1997-05), Human Factors (HF): User Interface design principles for the Telecommunications Management Network (TMN) applicable to the “G” Interface.
Customer documentation and product support

Customer documentation

Customer Documentation Welcome Page

Technical Support

http://support.alcatel-lucent.com

Documentation feedback

documentation.feedback@alcatel-lucent.com