Avaya Port Matrix:

IP Office 9.1.0.0

Issue 7.1
December 24, 2014

Avaya – Proprietary
Use pursuant to the terms of your signed agreement or Avaya policy.

ALL INFORMATION IS BELIEVED TO BE CORRECT AT THE TIME OF PUBLICATION AND IS PROVIDED "AS IS". AVAYA INC. DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND FURTHERMORE, AVAYA INC. MAKES NO REPRESENTATIONS OR WARRANTIES THAT THE INFORMATION PROVIDED HEREIN WILL ELIMINATE SECURITY THREATS TO CUSTOMERS' SYSTEMS. AVAYA INC., ITS RELATED COMPANIES, DIRECTORS, EMPLOYEES, REPRESENTATIVES, SUPPLIERS OR AGENTS MAY NOT, UNDER ANY CIRCUMSTANCES BE HELD LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, PUNITIVE, EXEMPLARY, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF THE INFORMATION PROVIDED HEREIN. THIS INCLUDES, BUT IS NOT LIMITED TO, THE LOSS OF DATA OR LOSS OF PROFIT, EVEN IF AVAYA WAS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. YOUR USE OF THIS INFORMATION CONSTITUTES ACCEPTANCE OF THESE TERMS.

1. Port Usage Tables

1.1 Port Usage Table Heading Definitions

Ingress Connections (In): This indicates connection requests that are initiated from external devices to open ports on this product. From the point of view of the product, the connection request is coming "In". (Note that in most cases, traffic will flow in both directions.)

Egress Connections (Out): This indicates connection requests that are initiated from this product to known ports on a remote device. From the point of view of the product, the connection request is going "Out". (Note that in most cases, traffic will flow in both directions.)

Intra-Device Connections: This indicates connection requests that both originate and terminate on this product. Normally these would be handled on the loopback interface, but there may be some exceptions where modules within this product must communicate on ports open on one of the physical Ethernet interfaces. These ports would not need to be configured on an external firewall, but may show up on a port scan of the product.

Destination Port: This is the default layer-4 port number to which the connection request is sent. Valid values include: 0 – 65535. A "(C)" next to the port number means that the port number is configurable. Refer to the Notes section after each table for specifics on valid port ranges.

Network/Application Protocol: This is the name associated with the layer-4 protocol and layers-5-7 application.

Optionally Enabled / Disabled: This field indicates whether customers can enable or disable a layer-4 port changing its default port setting. Valid values include: Yes or No

"No" means the default port state cannot be changed (e.g. enable or disabled).

"Yes" means the default port state can be changed and that the port can either be enabled or disabled.

Default Port State: A port is either open, closed, filtered or N/A.

Open ports will respond to queries

Closed ports may or may not respond to queries and are only listed when they can be optionally enabled.

Filtered ports can be open or closed. Filtered UDP ports will not respond to queries. Filtered TCP will respond to queries, but will not allow connectivity.

N/A is used for the egress default port state since these are not listening ports on the product.

External Device: This is the remote device that is initiating a connection request (Ingress Connections) or receiving a connection request (Egress Connections).

1.2 Port Tables

Below are the tables which document the port usage for this product.

Table 1. Ports for IP Office Solution

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
INGRESS CONNECTIONS							
1	22	TCP/SSH	No	Open	Admin terminal or SAL Gateway	Remote maintenance connection	Authenticated Username + password
2	67	UDP/DHCP	Yes	Open	DHCP clients such as IP Phones	IP Office DHCP service	
3	67	UDP/BOOTP Server	Yes	Open	Manager	Manager BOOTP server for IP address and firmware for IP Office	
4	69	UDP/TFTP	No	Open	Legacy Manager Upgrade Wizard	IP Office status, configuration data, program data, UDP Whois The information that is obtained can be controlled with security settings	Authenticated Obfuscated password
5	80 (Configurable 1-100)	TCP/HTTP	Yes	Open	File transfer Manager and phones Web client DECT R4 Provisioning SoftConsole WebSocket SCN VMPro	General purpose HTTP file and WebSocket server	Some URIs RFC2617 Authenticated
6	123	NTP	No	Open	DECT R4 IP Office	NTP (RFC 4330) Service - SNTP	
7	161 (Configurable 161, 1024-65535)	UDP/SNMP	Yes	Open	SNMP Agent	Read-only access to MIB entries	Authenticated Community string
8	411	TCP/HTTPS	Yes	Open	H.323 phone	Phone settings, backup/restore	

Avaya – Proprietary
Use pursuant to the terms of your signed agreement or Avaya policy.

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
9	443 (Configurable 1-65535)	TCP/HTTPS	Yes	Open	Softphone Manager and phones Web client DECT R4 Provisioning SoftConsole WebSocket SCN VMPro	General purpose HTTPS file and WebSocket server.	Authenticated Shared secret (softphone) X.509 certificate (IP Office)
10	520	UDP/RIP	Yes	Open	Router	Exchange routing information with adjacent IP routers or receive information	
11	1701	UDP/L2TP	Yes	Closed	Remote Network devices	Form layer 2 tunnels to remote network devices	Authenticated CHAP
12	1718	UDP/H.323 discovery	Yes	Filtered	H.323 phone	H.323 service to IP Phones	Authenticated Shared secret (password) HMAC-SHA1-96
13	1719	UDP/H.323 status	Yes	Filtered	H.323 phone	H.323 service to IP Phones	Authenticated Shared secret (password) HMAC-SHA1-96
14	1720	TCP /H.323 signaling	Yes	Filtered	H.323 phone	H.323 service to IP Phones	Authenticated Shared secret (password) HMAC-SHA1-96
15	4097	TCP	No	Filtered	N/A	Debug (disabled)	
16	5060-5061 (Configurable 1024-64510)	UDP+TCP+TLS/SIP	Yes	Open	SIP endpoint SIP trunk SIP Proxy		Authenticated MD5 CHAP

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
17	5443	TCP/HTTPS	Yes	Open	Backup/Restore client, UC client	Secure server for solution backup/restore Secure URI for VM listen from UC client Applies only to IP Office Linux and Application Server	
18	5480	TCP/HTTPS	Yes	Open	Web interface for Virtual Appliance Management Infrastructure (VAMI)	Applies only Virtual IP Office Linux and Application Server. No firewall configuration needed.	Authenticated
19	5488/5489	TCP	Yes	Open	CIM client for Virtual Appliance Management Infrastructure (VAMI)	Applies only Virtual IP Office Linux and Application Server. No firewall configuration needed.	Authenticated
20	5807 (Configurable 5800-5899)	TCP	Yes	Open	VNC Server	Used for VNC viewer	
21	7070	TCP/HTTPS	Yes	Open	Web Management client WebRTC signaling gateway	Applies only to IP Office Linux and Application Server	Authenticated Username + password
22	7071	TCP/HTTPS	Yes	Open	Web Management control	Applies only to IP Office Linux and Application Server	Authenticated Username + password
23	8000	TCP/HTTP	No	Open	Web Management client	Upgrade web service Log download	Authenticated Username + password
24	8411	TCP/HTTP	Yes	Open	H.323 phone	Firmware download	
25	8443 (Configurable 1-65535)	TCP/HTTPS	Yes	Open	Web Management client		
26	9080	TCP/HTTP	No	Open	Web Management client		Authenticated Username + password

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
27	40750-50750 (Configurable min start 1024, min end 2048)	UDP/RTP-RTCP UDP/SRTP-SRTCP	Yes	N/A	Media end points	IP Office Linux uses the port range of 32768-61000 for RTP connections with the media server Default IP500V2 range 46750 - 50750	
28	50780	UPD/Proprietary	Yes	Open	Dongle application	Not used	
29	50792	UPD/Voicemail	Yes	Open	Voicemail server	Voicemail Pro media	
30	50793	TCP/Proprietary	Yes	Open	Solo Server	TAPI Wave Driver – audio stream interface for TAPI based applications	
31	50794	UPD+TCP/SysMonitor	Yes	Open	System Monitor DevLink	Event, trace and diagnostics outputs	Authenticated Password
32	50795	UDP/Voicenet	Yes	Open	SCN Trunks	Small Community Networks peer to peer trunk signaling	
33	50796	TCP/TLS	Yes	Open	IPOCC/ACCS	CTI link from Contact Centre application	Authenticated Password
34	50797	TCP/TAPI	Yes	Open	TAPI clients CPA, PC Dialer, Web Agent	Control of telephones for TAPI or Outbound contact express	
35	50801	TCP/Proprietary	Yes	Open	Voice Conferencing application		
36	50802	TCP/Proprietary	Yes	Open	IP Office Manager, Web Management	Whois #2 and Whois #3, TCP discovery	
37	50804 (Configurable 49152-65280)	TCP/Proprietary	Yes	Open	IP Office Manager	IP Office configuration interface	Authenticated HMAC SHA-1 challenge sequence
38	50805 (Configurable 49152-65280)	TCP/TLS	Yes	Open	IP Office Manager	IP Office configuration interface secure (encrypted)	Authenticated HMAC SHA-1 challenge sequence X.509 Certificate
39	50808 (Configurable 49152-65280)	TCP/Proprietary	Yes	Open	System Status Application	IP Office status information	Authenticated HMAC SHA-1 challenge sequence

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
40	50809 (Configurable 49152-65280)	TCP/TLS	Yes	Open	System Status Application	IP Office status information secure (encrypted)	Authenticated HMAC SHA-1 challenge sequence
41	50812 (Configurable 49152-65280)	TCP/Proprietary	Yes	Open	IP Office Manager	IP Office security settings	Authenticated HMAC SHA-1 challenge sequence
42	50813 (Configurable 49152-65280)	TCP/TLS	Yes	Open	IP Office Manager	IP Office security settings secure (encrypted)	Authenticated HMAC SHA-1 challenge sequence X.509 Certificate
43	50814 (Configurable 49152-65280)	TCP/Proprietary	Yes	Open	One-X server	IP Office CTI control for One-X	Authenticated HMAC SHA-1 challenge sequence
44	50823	TCP	No	Closed	N/A	Debug IP Office Linux (disabled)	
45	52233	TCP/HTTPS	Yes	Closed	WebLM client	WebLM server for licensing	Authenticated X.509 certificate
46	56000-58000 (Configurable)	UDP/SRTP	No	Open	WebRTC Media Gateway	Media endpoints	
EGRESS CONNECTIONS							
1	25	TCP/SMTP	Yes	N/A	SMTP email server	Email transmission from IP Office	
2	37	UDP/TIME	Yes	N/A	Manager and VMPro	TIME (RFC868) Service	
3	53	UDP/DNS	Yes	N/A	DNS server	Name Service	
4	68	UDP/DHCP	Yes	N/A	DHCP server	IP Office obtaining DHCP address from a server	
5	68	UDP/BOOTP	Yes	N/A	Manager	IP Office obtaining IP address and firmware	
6	69	UDP/TFTP	Yes	N/A	Manager	IP Office obtaining firmware on behalf of phones	
7	123	UDP/NTP	Yes	N/A	NTP server	NTP (RFC 4330) Service - SNTP	

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
8	162 (Configurable)	UDP/SNMP	Yes	N/A	SNMP Receiver	Trap generation from IP Office	Authenticated Community string
9	389	TCP/LDAP	Yes	N/A	LDAP service	Import of directory information from LDAP database	Authenticated Kerberos 4 or simple password
10	443	TCP/HTTPS	Yes	N/A	SCEP server	Simple Certificate Enrollment Protocol (SCEP) to System Manager	password
11	500	UDP/IKE	Yes	N/A	Remote device	Form IPsec association with remote security devices	Authenticated Shared secret MD5 or SHA
12	514 (Configurable)	UDP+TCP/Syslog	Yes	N/A	Syslog server		
13	520	Yes	Open	Router	Exchange routing information with adjacent IP routers or receive information		
14	5060/5061	UDP+TCP+TLS/SIP	Yes	N/A	SIP trunk		Authenticated MD5 CHAP
15	5443	TCP/HTTPS	Yes	N/A	HTTPS server	Solution backup/restore using https	Authenticated Username + password
16	6514	TLS/Syslog	Yes	N/A	Syslog server		
17	10162	UDP/SNMP	Yes	N/A	SNMP trap	SNMP trap to System Manager	
18	40750-50750 (Configurable min start 1024, min end 2048)	UDP/RTP-RTCP UDP/SRTP-SRTCP	Yes	N/A	Media end points	IP Office Linux uses the port range of 32768-61000 for internal RTP connections with the media server Default IP500V2 range 46750 - 50750	
19	50791	UPD/Voicemail	Yes	N/A	Voicemail server	Voicemail Pro signaling/media	
20	50795	UDP/Voicenet	Yes	N/A	SCN Trunks	Small Community Networks peer to peer trunk signaling Legacy trunks only; WebSocket SCN uses 80/443.	

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
21	52233	TCP/HTTPS	Yes	N/A	WebLM server	Used for WebLM licensing	Authenticated X.509 certificate
INTRA-DEVICE CONNECTIONS							
1	4096	TCP	Yes	Open	IPOffice SNMP Agent		Internal, no firewall configuration required
2	4443	TCP/JMX	Yes	Open	WebRTC signaling gateway	Management port used by WebRTC Signal gateway to communicate with Media gateway	Internal, no firewall configuration required
3	4444	TCP/JMX	Yes	Open	WebRTC signaling gateway	Messaging port used by WebRTC Signal gateway to communicate with Media gateway	Internal, no firewall configuration required
4	5005 (Configurable)	TCP	Yes	Open	RTCP Monitoring		Internal, no firewall configuration required
5	6006	TCP	Yes	Open	QoS		Internal, no firewall configuration required
6	17777	TCP	Yes	Open	IPOffice and Jade	Communication between IPOffice and Jade	Internal, no firewall configuration required
7	42004(Configurable)	TCP/SIP	Yes	Open	WebRTC signaling gateway	SIP client connections from IP Office	Internal, no firewall configuration required
8	42008(Configurable)	TCP/SIP	Yes	Open	WebRTC signaling gateway	SIP trunk connections from IP Office	Internal, no firewall configuration required

NOTES:

The table lists the ports required for IP Office services (embedded and Linux) and applications such as Manager, SSA, SysMonitor.

Table 2. Ports for Voicemail Pro

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
INGRESS CONNECTIONS							
1	25	TCP	Yes	Open	SMTP	VMPro client for SMTP operations	
2	37	UDP/TIME	Yes	Open	IP Office	TIME (RFC868) Service for IP Office	
3	80	TCP/HTTP	Yes	Open	Browser, UC Client, one-X Server	Share access to Voicemail Pro media files with 1XP. E.g. greetings, voicemail message files etc. Web voicemail support Windows VMPro only	Authenticated
4	143	TCP/IMAP4	Yes	Open	IMAP4 client	Access to voicemails using IMAP4 over non-secure connection	
5	993	IMAP4 – SSL	Yes	Open	IMAP4 client – SSL	Access to voicemails using IMAP4 over SSL connection	
6	5443	TCP/HTTPS	No	Open	UC Client, one-X Server	Secured shared access to Voicemail Pro media files with 1XP and UC clients. Linux VMPro only	
7	50791	UDP-TCP/Voicemail	Yes	Open	Voicemail Pro client	Voicemail Pro communication with IP Office. This is also used for 1XP communication	
8	50792/50793	TCP/Voicemail	Yes	Open	Voicemail Pro MAPI proxy service	These ports are required on the Windows server machine which runs the Voicemail Pro MAPI service	
EGRESS CONNECTIONS							
1	22	TCP/FTP	Yes	N/A	Contact Recorder Backup file server	FTP or SFTP	
2	25	TCP	Yes	N/A	SMTP	Voicemail email integration	
3	443	TCP/HTTPS	Yes	N/A	Exchange Server	Web Service API client for Exchange integration	
4	50792	UDP/Voicemail	Yes	N/A	IP Office	Voicemail Pro media	
5	50792	SSL/Voicemail	Yes	N/A	Exchange MAPI Proxy	Exchange MAPI Proxy connector	
6	50793	SSL/Voicemail	Yes	N/A	Exchange MAPI Proxy	Exchange MAPI Proxy connector	
7	50802	TCP/Proprietary	No	N/A	IP Office	Whois	
INTRA-DEVICE CONNECTIONS							

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
1	25	TCP	Yes	Open	SMTP	Messaging and configuration updates between VMPro servers	

Table 3. Ports for One-X Portal

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
INGRESS CONNECTIONS							
1	4560	TCP/Log4j	No	Open	Log4j appender		
2	5222	TCP/XMPP	Yes	Open	XMPP client	Instant message clients	Authenticated Username + password
3	5269	TCP/XMPP	Yes	Open	XMPP federation	Instant message federation	Authenticated Username + password
4	7171	TCP/BOSH	Yes	Open	OpenFIre for BOSH		Authenticated Username + password
5	7443	TCP/BOSH	Yes	Open	OpenFire for BOSH		Authenticated Username + password
6	8005	TCP/Tomcat shutdown	No	Filtered	Tomcat shutdown listener		
7	8063	TCP/HTTPS	No	Open	Avaya Flare Communicator for Windows ®, Microsoft Outlook ® plugin, Call assistant and		Authenticated Username + password

Avaya – Proprietary
Use pursuant to the terms of your signed agreement or Avaya policy.

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
					Salesforce.com ® plug-in access to one-X Portal		
8	8069	TCP/HTTP	No	Open	Avaya Flare Communicator for Windows ®, Microsoft Outlook ® plugin, Call assistant and Salesforce.com ® plug-in access to one-X Portal		Authenticated Username + password
9	8080	TCP/HTTP	Yes	Open	Web Client	One-X Portal	Authenticated Username + password
10	8443	TCP/HTTPS	Yes	Open	Web Client	One-X Portal for Windows	Authenticated Username + password
11	8444	TCP/Proprietary	Yes	Open	Mobility client	Mobility client authentication	Authenticated Username + password
12	8666	TCP/JMX	Yes	Open	Java extension		Authenticated Username + password
13	9092	TCP/JDBC	No	Open	Database client listener		Authenticated Username + password
14	9094	TCP/XMP RPC	No	Open		OpenFire XML Remote Procedure Call and Admin console	Authenticated Username + password
15	9095	TCP/HTTPS	No	Open	Administration console	OpenFire Admin Console	
16	9443	TCP/HTTPS	Yes	Open	Web Client	One-X Portal secure/Web Collaboration	Authenticated Username + password X.509

Avaya – Proprietary
Use pursuant to the terms of your signed agreement or Avaya policy.

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
							Certificate
EGRESS CONNECTIONS							
1	80/8000	TCP/HTTP	Yes	N/A	Voicemail Pro	Voicemail Pro communication with 1XP	
2	50791	TCP/Voicemail	Yes	N/A	Voicemail Pro	Voicemail Pro communication with 1XP	
3	50814 (Configurable 49152-65280)	TCP/Proprietary	Yes	N/A	IP Office	IP Office CTI control for One-X	Authenticated HMAC SHA-1 challenge sequence
INTRA-DEVICE CONNECTIONS							
1	8086	TCP/HTTP	No	Open	XMPP	Internal REST interface	Internal, no firewall configuration required
2	61616	TCP/Proprietary	No	Open	Internal One-X server	Active MQ JMS Broker	

Table 4. Ports for Contact Recorder

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
INGRESS CONNECTIONS							
1	8805	TCP/Tomcat shutdown	No	Open	Tomcat shutdown listener	Used by Contact Store for internal activities.	
2	9444	TCP/HTTPS	No	Open	Web client	Http listener port.	
3	9888	TCP/HTTP	No	Open	Web client	Http listener port.	
EGRESS CONNECTIONS							

No.	Default Destination Port (Configurable Range)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
1	21	TCP	Yes	Open	FTP	FTP server for transferring VMPro recordings to Contacts store.	
2	22	TCP	Yes	Open	SFTP	SFTP server for transferring VMPro recordings to Contacts store.	
INTRA-DEVICE CONNECTIONS							
1	None						

1.3 Port Table Changes

Table 5. Port Changes From 8.1 FP to 9.0

No.	Default Destination Port (Interface)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
PORTS ADDED							
1	21	TCP	Yes	Open	FTP	This port is used by FTP server for transferring VMPro recordings to Contacts store.	
2	22	TCP	Yes	Open	SFTP	This port is used by SFTP server for transferring VMPro recordings to Contacts store.	
3	7071	TCP/HTTPS	No	Open	Web Management client	Web control access IP Office Linux	
4	8805	TCP/Tomcat shutdown	No	Open	Tomcat shutdown listener	This port is used by Contact Store for internal activities.	
5	9444	TCP/HTTPS	No	Open	Web client	This is the http listener port.	
6	9888	TCP/HTTP	No	Open	Web client	This is the http listener port.	
7	52233	TCP/HTTPS	Yes	N/A	Web LM server	WebLM licensing IP Office	
PORTS REMOVED							
1	None						

Table 6. Port Changes From 9.0 to 9.0.3 FP

No.	Default Destination Port (Interface)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
PORTS CHANGED							
1	47000-54000 (Configurable min start 1024, min end 2048)	UDP/RTP-RTCP	Yes	N/A	Media end points	IP Office Linux uses the port range of 32768-61000 for RTP connections with the media server	Default range was updated

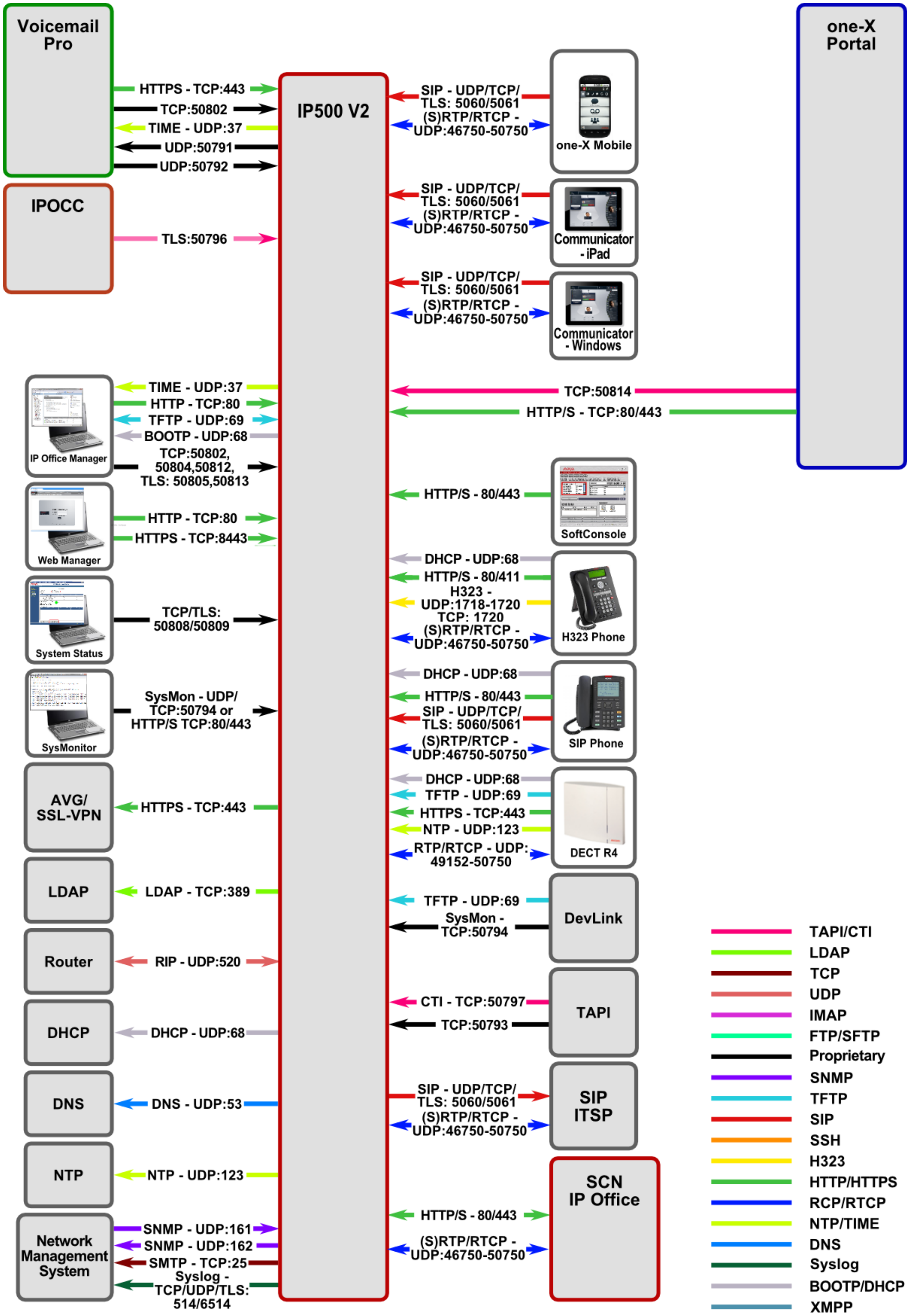
Table 7. Port Changes From 9.0.3 FP to 9.1.0

No.	Default Destination Port (Interface)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
PORTS ADDED							
1	411	TCP/HTTPS	Yes	Open	H.323 phone	Phone settings, backup/restore	
2	4443	TCP/JMX	Yes	Open	WebRTC signaling gateway	Management port used by WebRTC Signal gateway to communicate with Media gateway	
3	4444	TCP/JMX	Yes	Open	WebRTC signaling gateway	Messaging port used by WebRTC Signal gateway to communicate with Media gateway	
4	7171	TCP/BOSH	Yes	Open	OpenFIre for BOSH		
5	8086	TCP/HTTP	No	Open	XMPP	Internal REST interface	
6	52233	TCP/HTTPS	Yes	Closed	WebLM client	WebLM server for licensing	
7	56000-58000 (Configurable)	UDP/SRTP	No	Open	WebRTC Media Gateway	Media endpoints	

No.	Default Destination Port (Interface)	Network / Application Protocol	Optionally Enabled / Disabled?	Default Port State	External Device	Description	Notes
PORTS CHANGED							
1	40750-50750 (Configurable min start 1024, min end 2048)	UDP/RTP-RTCP	Yes	N/A	Media end points	IP Office Linux uses the port range of 32768-61000 for RTP connections with the media server	Default range updated
PORTS REMOVED: Custom Call Reporter not supported							
CCR INGRESS CONNECTIONS							
1	80	TCP/HTTP	No	Open	Web client		
2	443	TCP/HTTPS	No	Open	Web client		
3	1433	TCP/MSSQL	No	Open	MSSQL	MSSQL server	
4	1434	TCP/MSSQL	No	Open	MSSQL	MSSQL monitor	
5	8135	TCP/Proprietary	No	Open	Wallboard		
6	8080	TCP/SOAP	No	Open	One-X server	Communication with One-X	Authenticated Username + password
CCR EGRESS CONNECTIONS							
1	25	TCP/SMTP	Yes	N/A	SMTP email server	Email transmission	
2	50804	TCP/Proprietary	No	N/A	IP Office	SSI client (system status information)	Authenticated HMAC SHA-1 challenge sequence

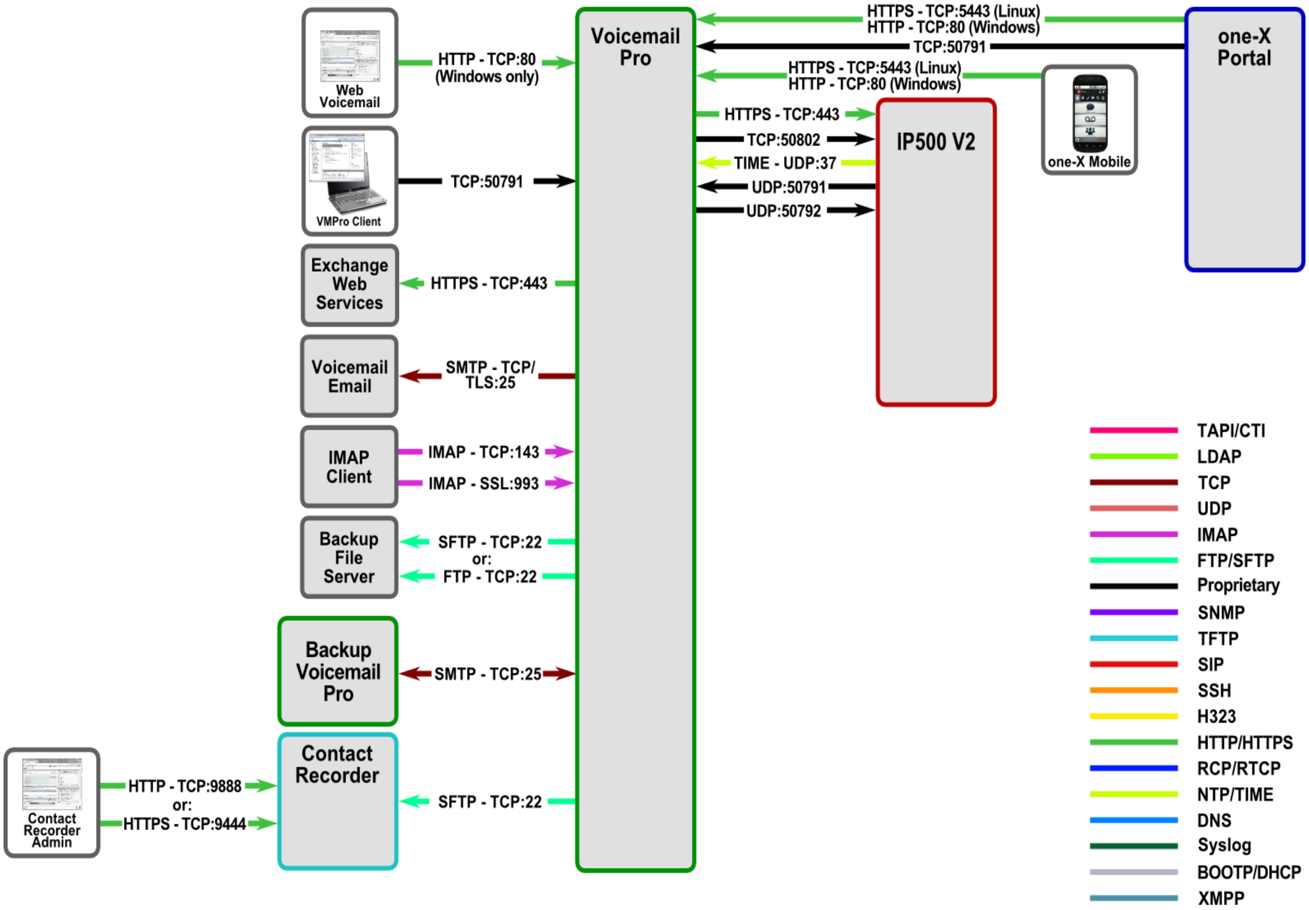
Appendix A: Port/Protocol InterConnect Diagrams

The following diagrams show port & protocol connections for IP Office Release 9.1.0.0 in various typical deployments. No legacy ports/protocols are shown.

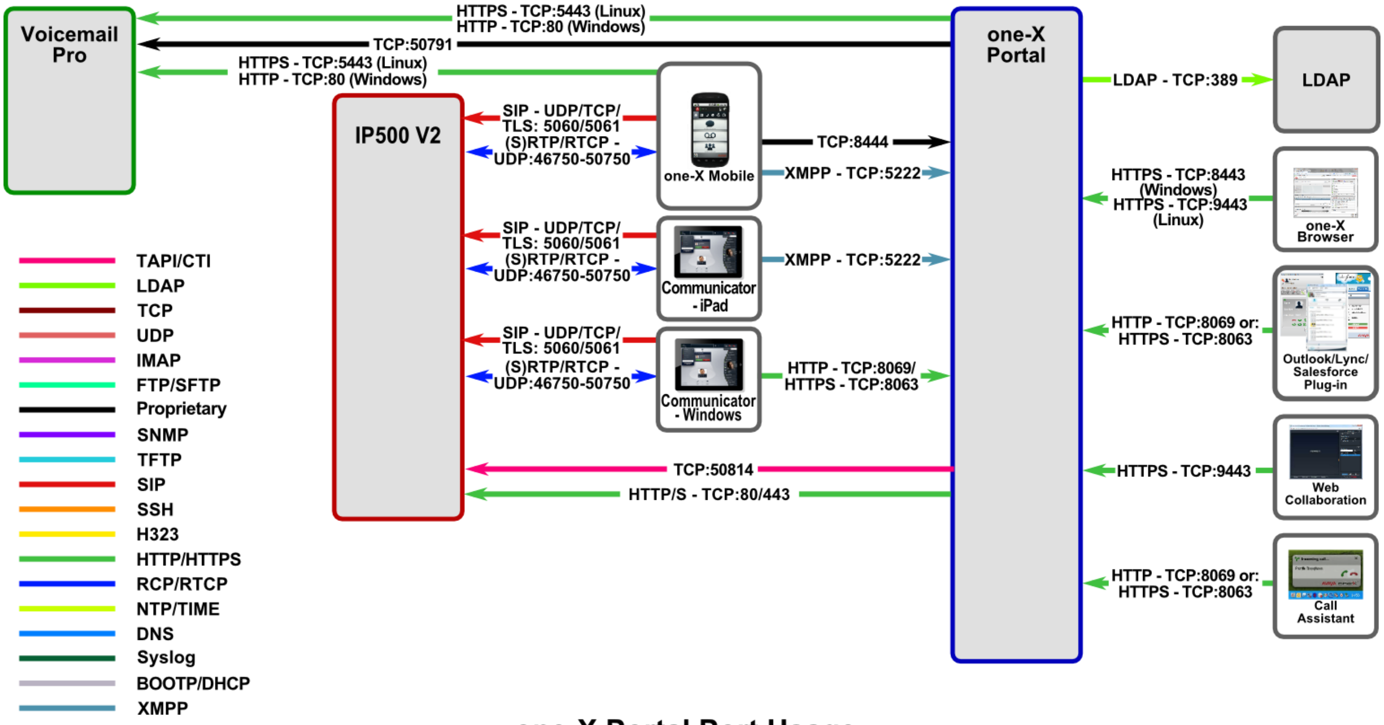


IP500 V2 Port Usage

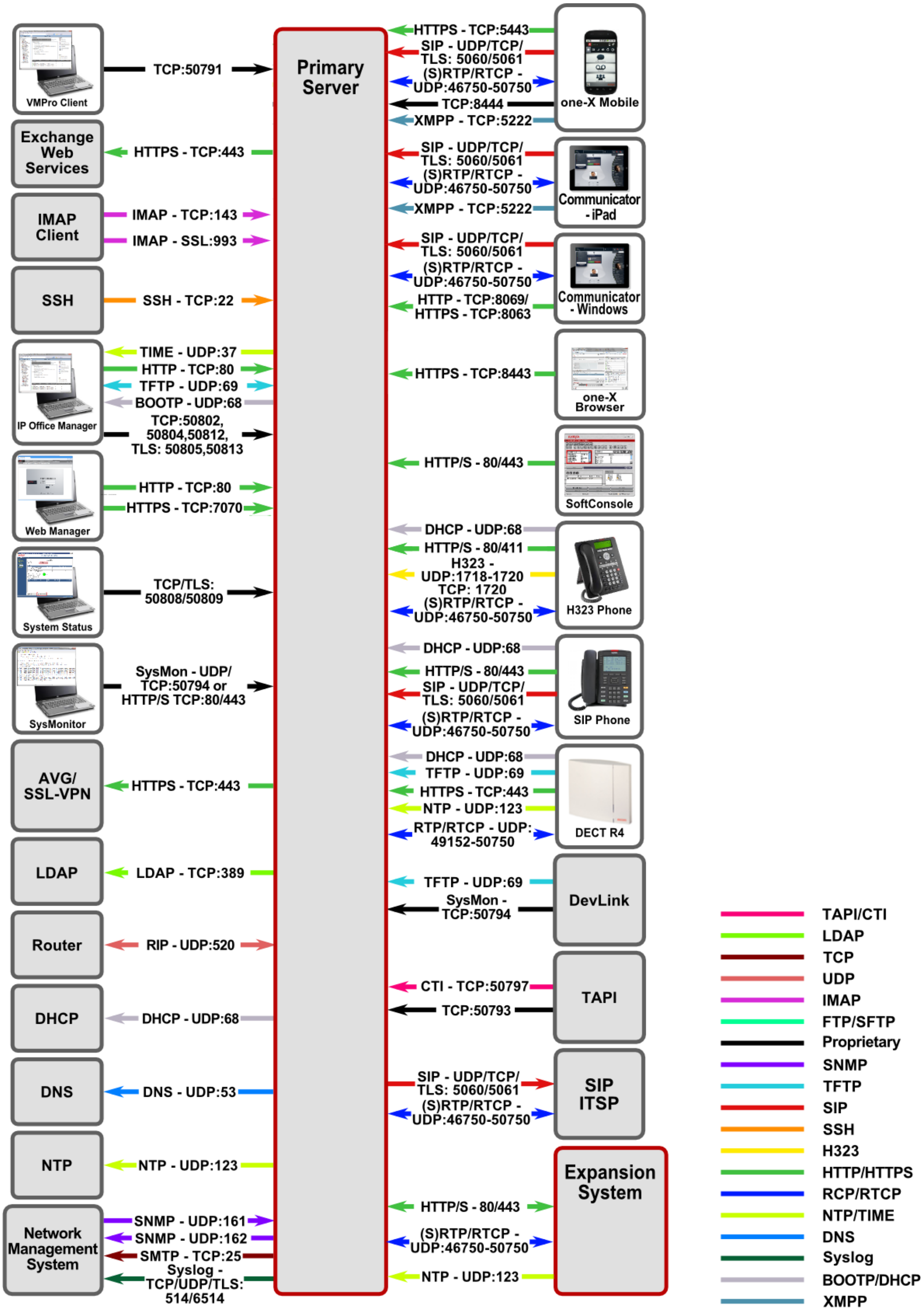
Avaya – Proprietary
Use pursuant to the terms of your signed agreement or Avaya policy.



Voicemail Pro Port Usage



one-X Portal Port Usage



Primary Server Port Usage

Avaya – Proprietary

Use pursuant to the terms of your signed agreement or Avaya policy.

Appendix B: Overview of TCP/IP Ports

What are ports and how are they used?

TCP and UDP use ports (defined at http://www.iana.org/assignments/port-numbers) to route traffic arriving at a particular IP device to the correct upper layer application. These ports are logical descriptors (numbers) that help devices multiplex and de-multiplex information streams. Consider your desktop PC. Multiple applications may be simultaneously receiving information. In this example, email may use destination TCP port 25, a browser may use destination TCP port 80 and a telnet session may use destination TCP port 23. These logical ports allow the PC to de-multiplex a single incoming serial data packet stream into three mini-streams inside the PC. Furthermore, each of the mini-streams is directed to the correct high-level application because the port numbers identify which application each data mini-stream belongs. Every IP device has incoming (Ingress) and outgoing (Egress) data streams.

Ports are used in TCP and UDP to name the ends of logical connections which carry data flows. TCP and UDP streams have an IP address and port number for both source and destination IP devices. The pairing of an IP address and a port number is called a socket (discussed later). Therefore, each data stream is uniquely identified with two sockets. Source and destination sockets must be known by the source before a data stream can be sent to the destination. Some destination ports are “open” to receive data streams and are called “listening” ports. Listening ports actively wait for a source (client) to make contact to a destination (server) using a specific port that has a known protocol associate with that port number. HTTPS, as an example, is assigned port number 443. When a destination IP device is contacted by a source device using port 443, the destination uses the HTTPS protocol for that data stream conversation.

Port Type Ranges

Port numbers are divided into three ranges: Well Known Ports, Registered Ports, and Dynamic Ports (sometimes called Private Ports).

Well Known Ports are those numbered from 0 through 1023.

Registered Ports are those numbered from 1024 through 49151

Dynamic Ports are those numbered from 49152 through 65535

The Well Known and Registered ports are assigned by IANA (Internet Assigned Numbers Authority) and are found here: http://www.iana.org/assignments/port-numbers.

Well Known Ports

For the purpose of providing services to unknown clients, a service listen port is defined. This port is used by the server process as its listen port. Common services often use listen ports in the well-known port range. A well-known port is normally active meaning that it is “listening” for any traffic destined for a specific application. For example, well known port 23 on a server is actively waiting for a data source to contact the server IP address using this port number to establish a Telnet session. Well known port 25 is waiting for an email session, etc. These ports are tied to a well understood application and range from 0 to 1023.

In UNIX and Linux operating systems, only root may open or close a well-known port. Well Known Ports are also commonly referred to as “privileged ports”.

Registered Ports

Unlike well-known ports, these ports are not restricted to the root user. Less common services register ports in this range. Avaya uses ports in this range for call control. Some, but not all, ports used by Avaya in this range include: 1719/1720 for H.323, 5060/5061 for SIP, 2944 for H.248 and others. The registered port range is 1024 – 49151. Even though a port is registered with an application name, industry often uses these ports for different applications. Conflicts can occur in an enterprise when a port with one meaning is used by two servers with different meanings.

Dynamic Ports

Dynamic ports, sometimes called “private ports”, are available to use for any general purpose. This means there are no meanings associated with these ports (similar to RFC 1918 IP Address Usage). These are the safest ports to use because no application types are linked to these ports. The dynamic port range is 49152 – 65535. On IP Office Linux systems the default port range is 32768-61000

Sockets

A socket is the pairing of an IP address with a port number. An example would be 192.168.5.17:3009, where 3009 is the socket number associated with the IP address. A data flow, or conversation, requires two sockets – one at the source device and one at the destination device. The data flow then has two sockets with a total of four logical elements. Each data flow must be unique. If one of the four elements is unique, the data flow is unique. The following three data flows are uniquely identified by socket number and/or IP address.

Data Flow 1:	172.16.16.14:1234	-	10.1.2.3:2345
Data Flow 2:	172.16.16.14.123**5**	-	10.1.2.3:2345
Data Flow 3:	172.16.16.14:1234	-	10.1.2.4:2345

Data flow 1 has two different port numbers and two different IP addresses and is a valid and typical socket pair.
Data flow 2 has the same IP addresses and the same port number on the second IP address as data flow 1, but since the port number on the first socket differs, the data flow is unique.
Therefore, if one IP address octet changes, or one port number changes, the data flow is unique.

Figure 1, below, is an example showing ingress and egress data flows from a PC to a web server.

Socket Example Diagram

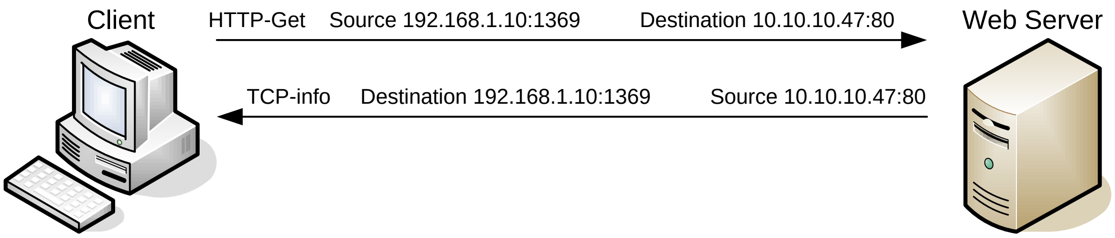


Figure 1. Socket Example

Notice the client egress stream includes the client's source IP and socket (1369) and the destination IP and socket (80). The ingress stream has the source and destination information reversed because the ingress is coming from the server.

Understanding Firewall Types and Policy Creation

Firewall Types

There are three basic firewall types:

- Packet Filtering
- Application Level Gateways (Proxy Servers)
- Hybrid (Stateful Inspection)

Packet Filtering is the most basic form of the firewalls. Each packet that arrives or leaves the network has its header fields examined against criterion to either drop the packet or let it through. Routers configured with Access Control Lists (ACL) use packet filtering. An example of packet filtering is preventing any source device on the Engineering subnet to telnet into any device in the Accounting subnet.

Application level gateways (ALG) act as a proxy, preventing a direct connection between the foreign device and the internal destination device. ALGs filter each individual packet rather than blindly copying bytes. ALGs can also send alerts via email, alarms or other methods and keep log files to track significant events.

Hybrid firewalls are dynamic systems, tracking each connection traversing all interfaces of the firewall and making sure they are valid. In addition to looking at headers, the content of the packet, up through the application layer, is examined. A stateful inspection firewall also monitors the state of the connection and compiles the information in a state table. Stateful inspection firewalls close off ports until the connection to the specific port is requested. This is an enhancement to security against port scanning[1].

Firewall Policies

The goals of firewall policies are to monitor, authorize and log data flows and events. They also restrict access using IP addresses, port numbers and application types and sub-types.

This paper is focused with identifying the port numbers used by Avaya products so effective firewall policies can be created without disrupting business communications or opening unnecessary access into the network.

Knowing that the source column in the following matrices is the socket initiator is key in building some types of firewall policies. Some firewalls can be configured to automatically create a return path through the firewall if the initiating source is allowed through. This option removes the need to enter two firewall rules, one for each stream direction, but can also raise security concerns.

Another feature of some firewalls is to create an umbrella policy that allows access for many independent data flows using a common higher layer attribute. Finally, many firewall policies can be avoided by placing endpoints and the servers that serve those endpoints in the same firewall zone.

[1] The act of systematically scanning a computer's ports. Since a port is a place where information goes into and out of a computer, port scanning identifies open doors to a computer. Port scanning has legitimate uses in managing networks, but port scanning also can be malicious in nature if someone is looking for a weakened access point to break into your computer.