Cisco TelePresence Video Communication Server (Cisco VCS) IP Port Usage for Firewall Traversal

Cisco VCS X8.1

D14606.05

December 2013

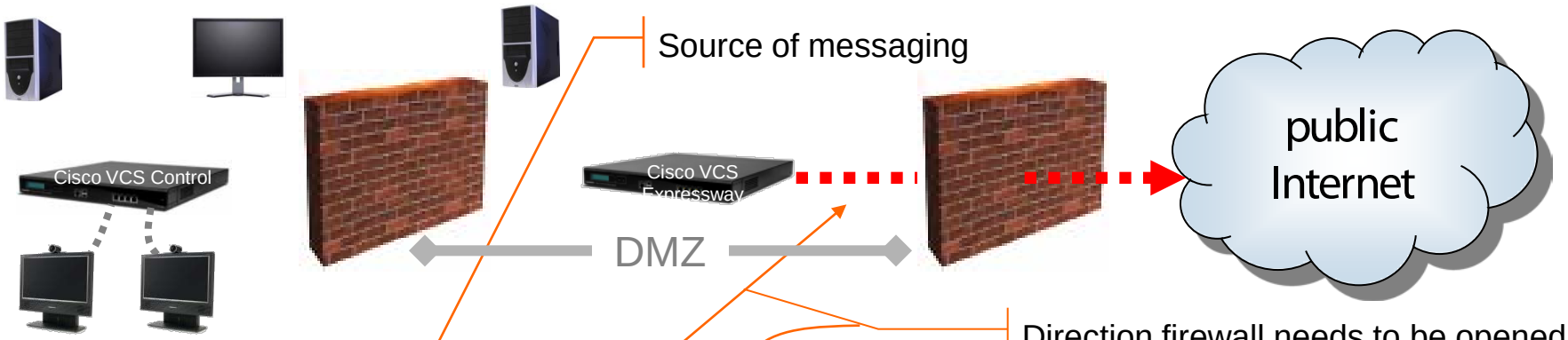
Contents: Cisco VCS IP port usage

Which IP ports are used with Cisco VCS?

Which IP ports need to be allowed through firewalls?

- Format of information
- Traversing firewalls
  - Administration
  - SIP calls
  - H.323 calls
- Internal
  - Administration
  - SIP calls
  - H.323 calls

Guide to this document: format of information



		VCS Expressway source port	Server listening port
Management control		DMZ to public	
Open firewall		DMZ to public	
IP address		IP address of VCS Expressway	IP address of DNS server
IP Ports	DNS	UDP **S** *>= 1024*	UDP **53** *53*

Direction firewall needs to be opened

Destination of messaging

Direction of management / calls

S = Source port , typically >= 1024

Details of what defines the IP port ID / range

Destination of messaging: IP address

Source of messaging: IP address

Destination of messaging: IP port

- letter reference for more details
- default / expected port range in italics

Source of messaging: IP port

- letter reference for more details
- default / expected port range in italics

Firewall needs to have a pinhole open for at least

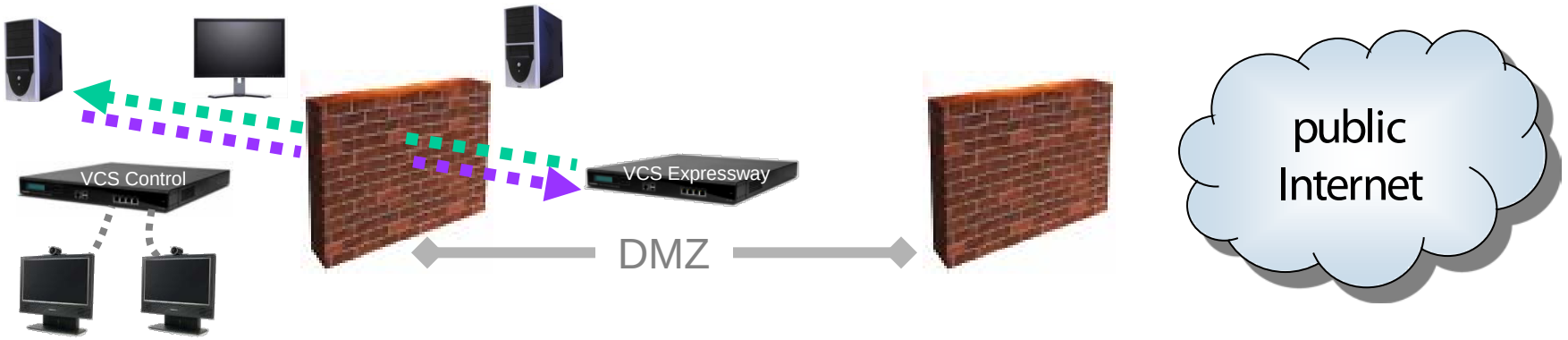
- all source ports at IP address of source

to

- all listening ports at IP address of listener

When a firewall allows an outbound message through, it is assumed that responses (up to about 20 to 30 seconds after the original send) will be allowed back through the firewall

Administration: Cisco VCS Expressway

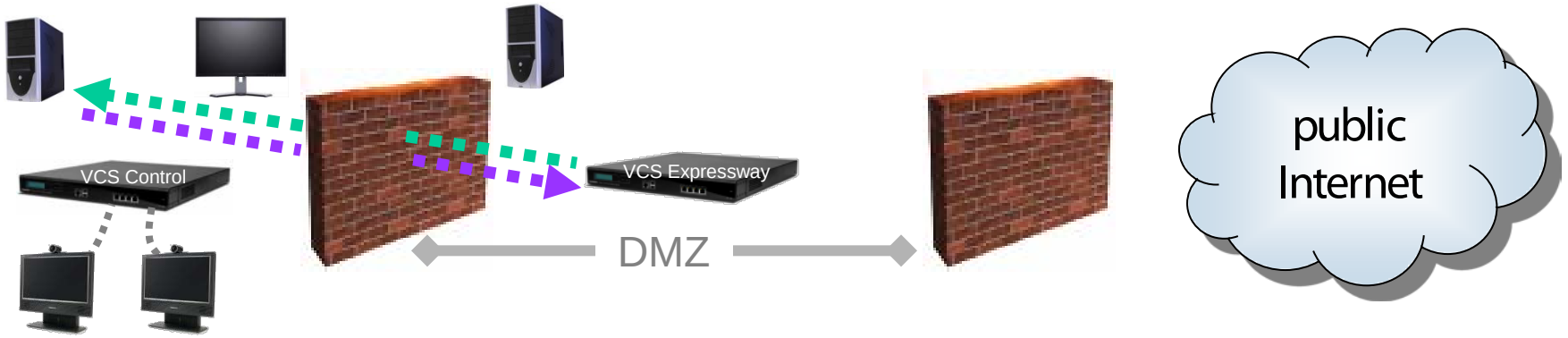


		Management system source port	VCS Expressway server (listening) port
Management control		Private to DMZ	
Open firewall		Private to DMZ	
IP address		IP address of management computer(s)	IP address of VCS Expressway
IP Ports	http	TCP **S** *>= 1024*	TCP **80** *80*
	https	TCP **S** *>= 1024*	TCP **443** *443*
	ssh	TCP **S** *>= 1024*	TCP **22** *22*
	SNMP	UDP **S** *>= 1024*	UDP **161** *161*

Management ports
… only open ports for the management methods to be used

S = Source port , typically >= 1024

Administration: Cisco VCS Expressway



		PC listening port	VCS Expressway source port
Management control		DMZ to private	
Open firewall		DMZ to private	
IP address		IP address of management computer(s)	IP address of VCS Expressway
IP Ports	NTP	UDP **123** *123*	UDP **123** *123*
	LDAP (for login)	TCP **389 or 636** *389 or 636*	TCP **Ue** *30000 to 35999 **
	Syslog	*UDP **514*** *514*	*UDP **Ve*** *30000 to 35999 **

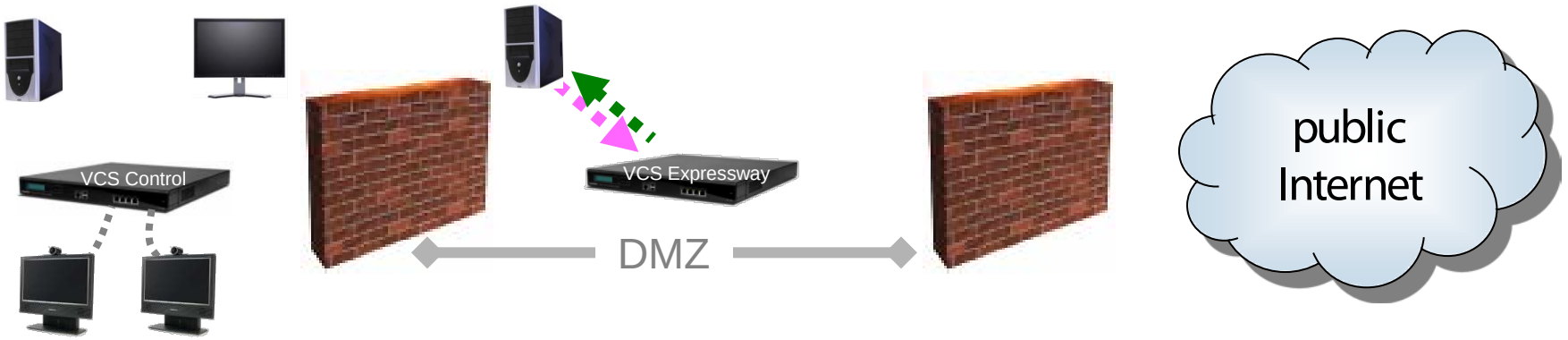
Management ports
… only open ports for the management methods to be used

Ue = VCS TCP ephemeral port range defaults to 30000 to 35999 *

Ve = VCS UDP ephemeral port range defaults to 30000 to 35999 *

* The default ephemeral port range of 30000 – 35999 applies to new installations of X8.1 or later; the previous default range of 40000 - 49999 still applies to earlier releases that have upgraded to X8.1.

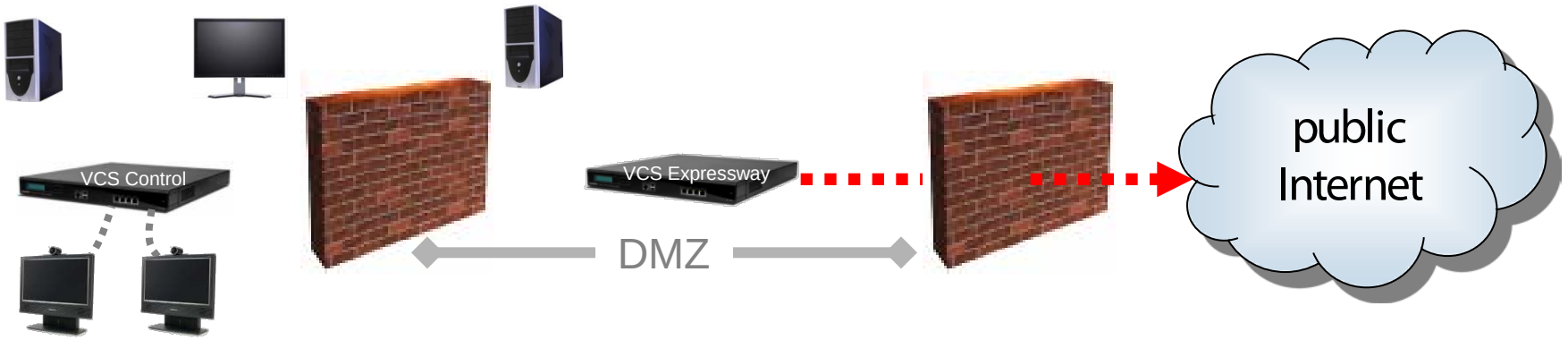
Administration: Cisco VCS Expressway



		TMS source port	VCS Expressway (listening) port	TMS (listening) port	VCS Expressway source port
Call direction		TMS to VCS Expressway		VCS Expressway to TMS	
Open firewall		n/a		n/a	
IP address		External IP address of TMS	IP address of VCS Expressway	External IP address of TMS	IP address of VCS Expressway
IP Ports	https (TMS to VCS and secure feedback from VCS to TMS)	TCP **S** *>= 1024*	TCP **443** *443*	TCP **443** *443*	TCP **S** *>= 1024*
	http (feedback to TMS)	-	-	TCP **80** *80*	TCP **S** *>= 1024*
	SNMP (To TMS)	UDP **S** *>= 1024*	UDP **161** *161*		

S = Source port , typically >= 1024

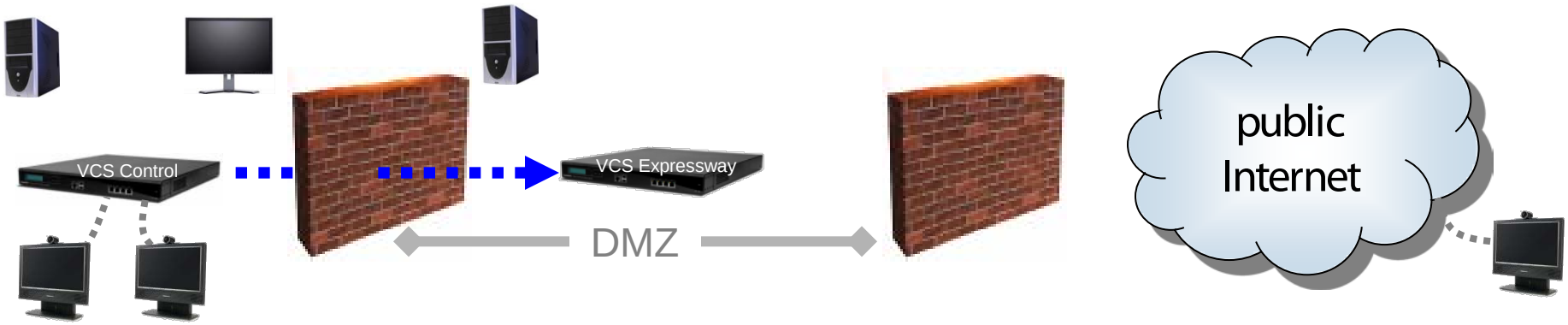
Administration: Cisco VCS Expressway



		VCS Expressway source port	Server listening port
Management control		DMZ to public	
Open firewall		DMZ to public	
IP address		IP address of VCS Expressway	IP address of DNS Server
IP Ports	DNS	UDP **S** *>= 1024*	UDP **53** *53*

S = Source port , typically >= 1024

SIP traversal call



		VCS Control source port	VCS Expressway server (listening) port
Call direction		Inbound and outbound calls	
Open firewall		Private to DMZ	
IP address		IP address of VCS Control	IP address of VCS Expressway
IP Ports	SIP signaling	TCP & TLS **A** *25000 to 29999*	TCP and TLS **B** *7001*
	Assent RTP (traversal media)	UDP $\mathbf{Y_C}$ *36002 to 59999* **	UDP $\mathbf{Y_E}$ *36000 to 36001* **
	Assent RTCP (traversal media)	UDP $\mathbf{Y_C}$ *36002 to 59999* **	UDP $\mathbf{Y_E}$ *36000 to 36001* **

A = Protocols > SIP > TCP Outbound port start to end: *default = 25000 to 29999*

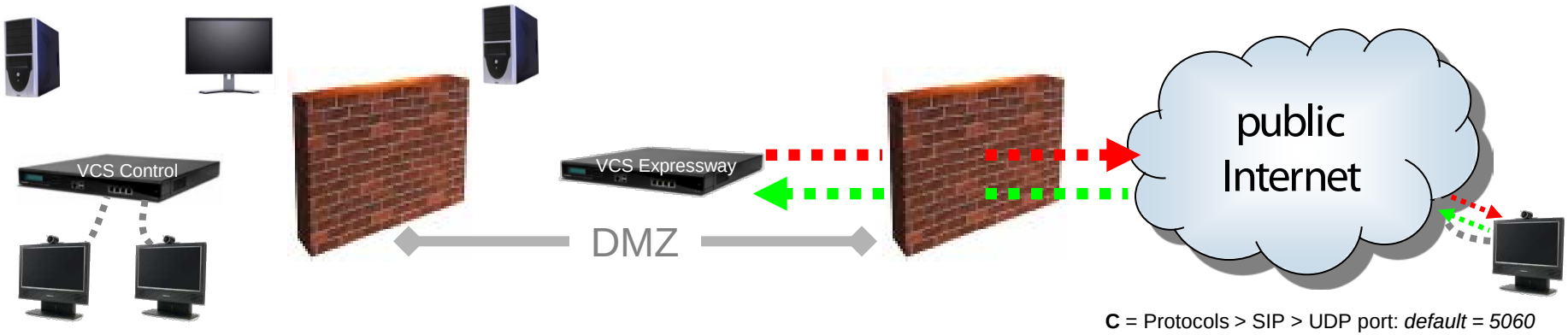
B = Zones > Traversal Client > SIP port, typically *7001* for first traversal zone, *7002* for second etc.

$\mathbf{Y_C}$ = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Control): *default = 36000 to 59999* **

$\mathbf{Y_E}$ = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway): *default = 36000 to 59999* **

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

SIP call to endpoint with public IP address



		VCS Expressway source port	Internet endpoint server (listening) port	VCS Expressway server (listening) port	Internet endpoint source port
Call direction		Outbound to an endpoint in the Internet		Inbound from an endpoint in the Internet	
Open firewall		DMZ to Internet		Internet to DMZ	
IP address		IP address of VCS Expressway	Any IP address	IP address of VCS Expressway	Any IP address
IP Ports	SIP signaling	UDP **C** *5060* TCP & TLS **A** *25000 to 29999*	UDP & TCP & TLS **F** *5060 or >= 1024*	UDP: **C** *5060* TCP: **K** *5060* TLS: **L** *5061*	UDP **G** *5060 or >= 1024* TCP & TLS **H** *>= 1024*
	RTP	UDP **Y_E** *36002 to 59999* **	UDP **E** *>= 1024*	UDP **Y_E** *36002 to 59999* **	UDP **E** *>= 1024*
	RTCP	UDP **Y_E** *36002 to 59999* **	UDP **E** *>= 1024*	UDP **Y_E** *36002 to 59999* **	UDP **E** *>= 1024*

C = Protocols > SIP > UDP port: *default = 5060*

A = Protocols > SIP > TCP Outbound port start to end: *default = 25000 to 29999*

F = defined by endpoint's registration (or not registered, IP port is defined by DNS lookup) any port >= *1024*, often 5060 for UDP

K = Protocols > SIP > TCP port: *default = 5060*

L = Protocols > SIP > TLS port: *default =5061*

G = any port >= *1024*, often 5060 for hard endpoints

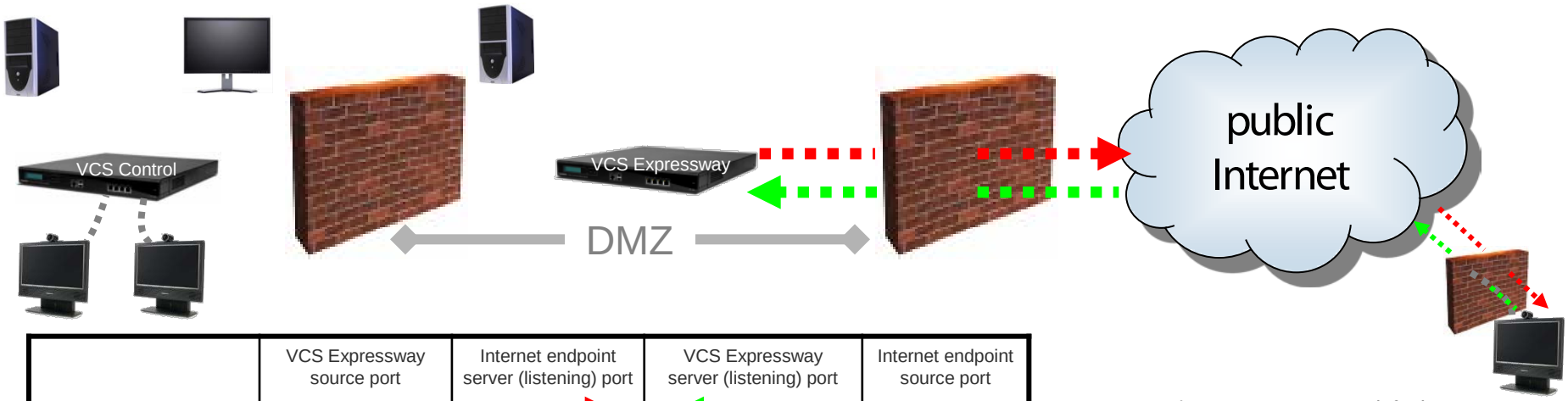
H = any port >= *1024*

Y_E = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway): *default = 36000 to 59999* **

E = Endpoint media port range; value used is specified in the SDP:
= any IP port above 1024
= 36000 to 59999 ** for another VCS
= 2326 to 2385 for MXP static setting
= 11000 to 65000 for MXP dynamic setting

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

SIP call to endpoint behind non SIP-aware firewall



		VCS Expressway source port	Internet endpoint server (listening) port	VCS Expressway server (listening) port	Internet endpoint source port
Call direction		Outbound to an endpoint behind a firewall		Inbound from an endpoint behind a firewall	
Open firewall		DMZ to Internet		Internet to DMZ	
IP address		IP address of VCS Expressway	Any IP address	IP address of VCS Expressway	Any IP address
IP Ports	SIP signaling	UDP **C** *5060* TCP & TLS **A** *25000 to 29999*	UDP & TCP & TLS **F** *5060 or >= 1024*	UDP: **C** *5060* TCP: **K** *5060* TLS: **L** *5061*	UDP, TCP & TLS: **Q** *>= 1024*
	RTP	UDP $\mathbf{Y_E}$ *36002 to 59999* **	UDP **N** *>= 1024*	UDP $\mathbf{Y_E}$ *36002 to 59999* **	UDP **N** *>= 1024*
	RTCP	UDP $\mathbf{Y_E}$ *36002 to 59999* **	UDP **N** *>= 1024*	UDP $\mathbf{Y_E}$ *36002 to 59999* **	UDP **N** *>= 1024*

C = Protocols > SIP > UDP port: *default = 5060*

A = Protocols > SIP > TCP Outbound port start to end: *default = 25000 to 29999*

F = defined by endpoint's registration (or if call is to a non registered endpoint, IP port is defined by DNS lookup) any port >= *1024*, often 5060 for UDP

K = Protocols > SIP > TCP port: *default = 5060*

L = Protocols > SIP > TLS port: *default =5061*

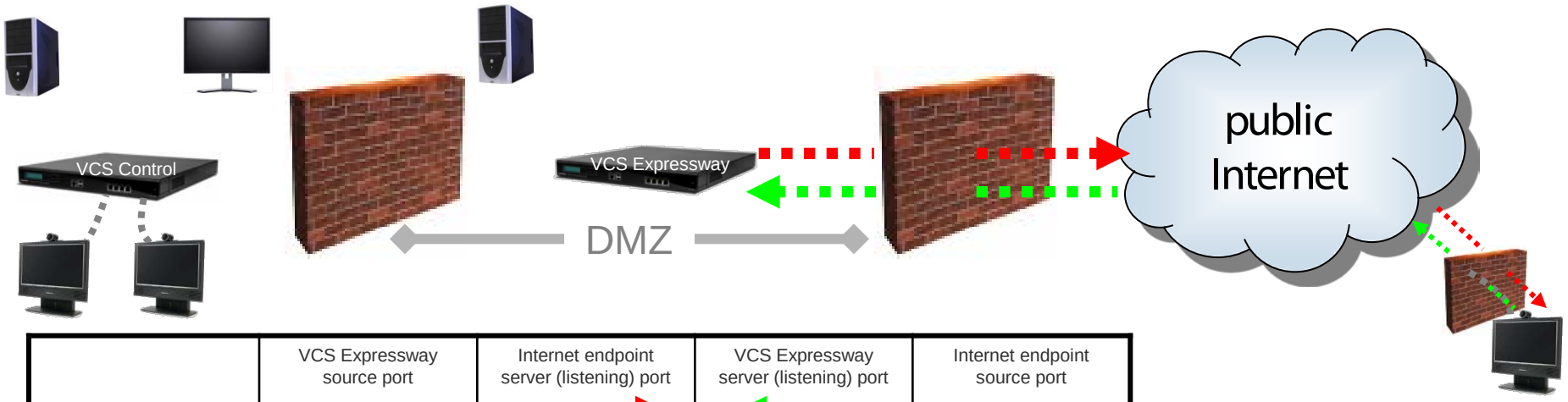
Q = Egress IP port from far end non-NAT aware firewall: any port >= *1024*

$\mathbf{Y_E}$ = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway): *default = 36000 to 59999* **

N = VCS waits until it receives media, then it sends its media to the IP port from which the media was received (egress port of the media from the far end non SIP-aware firewall): any port >= *1024*

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

SIP – additional ports for ICE



		VCS Expressway source port	Internet endpoint server (listening) port	VCS Expressway server (listening) port	Internet endpoint source port
message direction		Outbound from VCS to endpoint in internet		Inbound from an endpoint in internet to VCS	
Open firewall		DMZ to Internet		Internet to DMZ	
IP address		IP address of VCS Expressway	Any IP address	IP address of VCS Expressway	Any IP address
IP Ports	TURN server control	N/A	N/A	UDP **R** *3478 (to 3483)*	UDP **M** *>= 1024*
	TURN server media	UDP *24000 to 29999 **	UDP **N** *>= 1024*	UDP *24000 to 29999 **	UDP **N** *>= 1024*

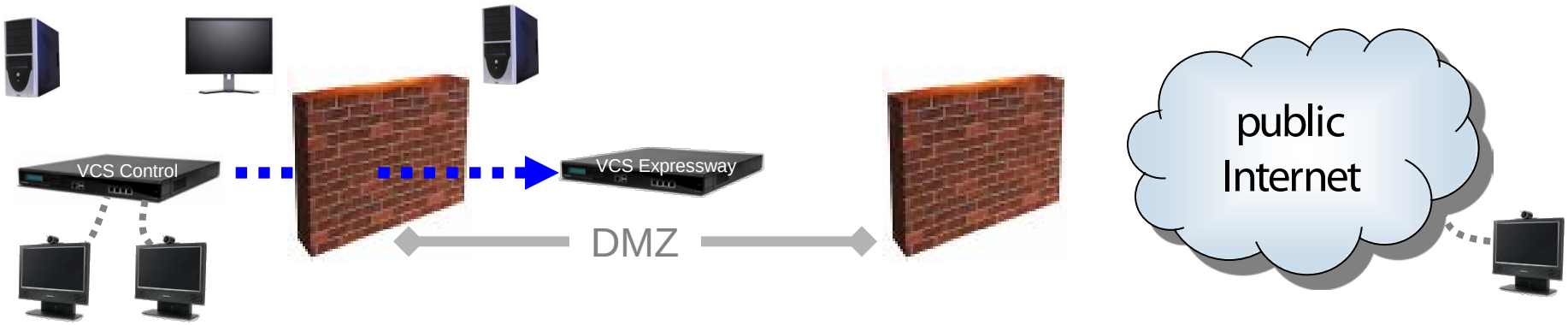
M = IP port of signalling from endpoint – may be ephemeral IP port of endpoint (if no firewall), or IP port of the outside firewall :
= *any IP port above 1024*

N = IP port of relevant ICE candidate – host IP port, Server reflexive IP port (outside firewall port) or TURN server port:
= *any IP port above 1024*

R = On Large VM server deployments you can configure a range of TURN request listening ports

* For new installations of X8.1 or later, the default range for TURN relay media ports is 24000 – 29999. The previous default range of 60000 – 61799 still applies to earlier releases that have upgraded to X8.1.

H.323 traversal call using Assent



		VCS Control source port	VCS Expressway server (listening) port
Call direction		Inbound and outbound calls	
Open firewall		Private to DMZ	
IP address		IP address of VCS Control	IP address of VCS Expressway
IP Ports	Initial RAS connection	UDP **R_C** *1719*	UDP **D** *6001*
	Q 931 / H.225 signaling	TCP **P** *15000 to 19999*	TCP **T** *2776*
	H.245	TCP **P** *15000 to 19999*	TCP **T** *2776*
	Assent RTP (traversal media)	UDP **Y_C** *36002 to 59999* **	UDP **Y_E** *36000 to 36001* **
	Assent RTCP (traversal media)	UDP **Y_C** *36002 to 59999* **	UDP **Y_E** *36000 to 36001* **

R_C = Protocols > H.323 > Gatekeeper > Registration UDP port: *default = 1719*

P = Protocols > H.323 > Gatekeeper > Call signaling port range start to end: *default = 15000 to 19999*

D = Zones > Traversal Zone > H.323 port, typically *6001* for first traversal zone, 6002 for second etc.

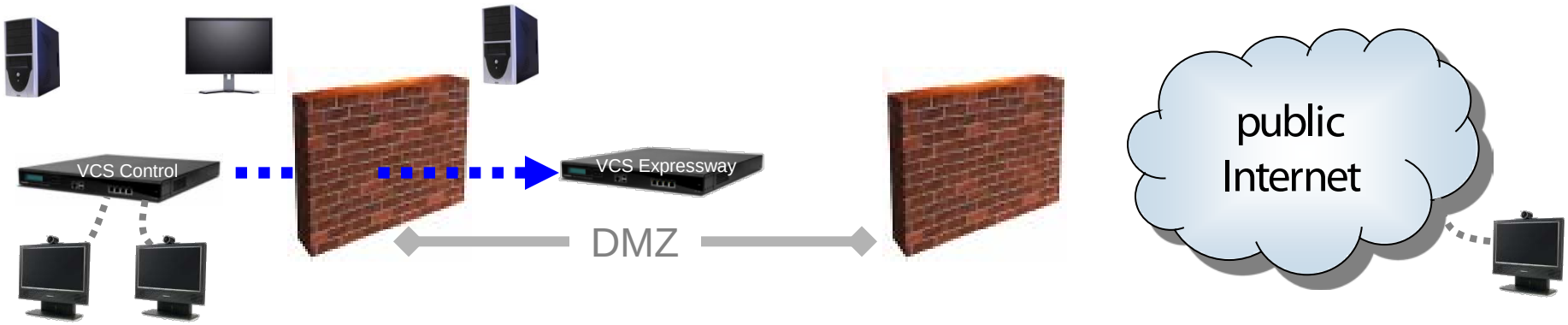
T = Traversal > Ports > H.323 Assent call signaling port: *default = 2776*

Y_C = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Control): *default = 36000 to 59999* **

Y_E = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway): *default = 36000 to 59999* **

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

H.323 traversal call using H.460.18 / 19 non-muxed media



		VCS Control source port	VCS Expressway server (listening) port
Call direction		Inbound and outbound calls	
Open firewall		Private to DMZ	
IP address		IP address of VCS Control	IP address of VCS Expressway
IP Ports	Initial RAS connection	UDP **R_C** *1719*	UDP **D** *6001*
	Q 931 / H.225 signaling	TCP **P** *15000 to 19999*	TCP **M** *1720*
	H.245	TCP **P** *15000 to 19999*	TCP **U** *2777*
	Assent RTP (traversal media)	UDP **Y_C** *36002 to 59999* **	UDP **Y_E** *36002 to 59999* **
	Assent RTCP (traversal media)	UDP **Y_C** *36002 to 59999* **	UDP **Y_E** *36002 to 59999* **

R_C = Protocols > H.323 > Gatekeeper > Registration UDP port: *default = 1719*

P = Protocols > H.323 > Gatekeeper > Call signaling port range start to end: *default = 15000 to 19999*

D = Zones > Traversal Zone > H.323 port, typically *6001* for first traversal zone, 6002 for second etc.

M = Protocols > H.323 Call signaling TCP port: *default = 1720*

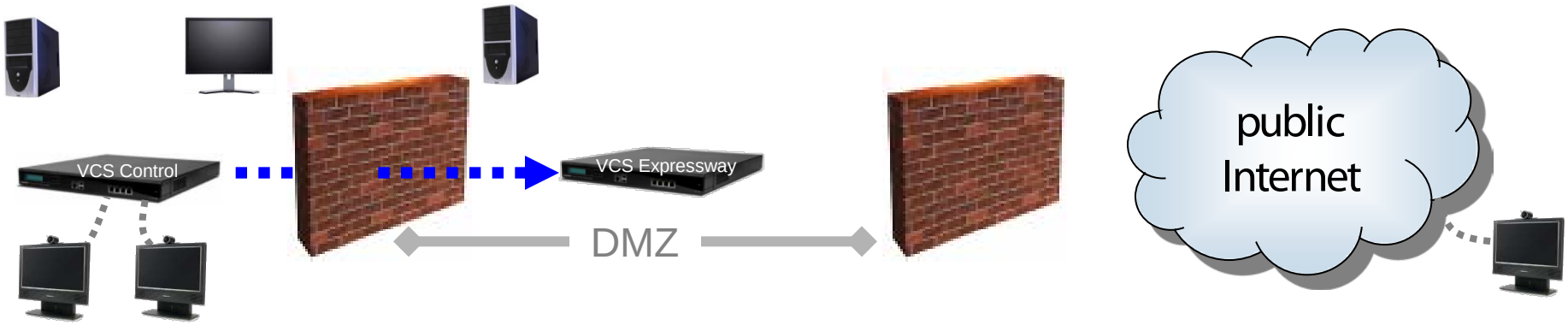
U = Traversal > Ports > H.323 H.460.18 call signaling port: *default = 2777*

Y_C = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Control): *default = 36000 to 59999* **

Y_E = Local Zone < Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway) : *default = 36000 to 59999* **

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

H.323 traversal call using H.460.18 / 19 multiplexed media



		VCS Control source port	VCS Expressway server (listening) port
Call direction		Inbound and outbound calls	
Open firewall		Private to DMZ	
IP address		IP address of VCS Control	IP address of VCS Expressway
IP Ports	Initial RAS connection	UDP **R_C** *1719*	UDP **D** *6001*
	Q 931 / H.225 signaling	TCP **P** *15000 to 19999*	TCP **M** *1720*
	H.245	TCP **P** *15000 to 19999*	TCP **U** *2777*
	Assent RTP (traversal media)	UDP **Y_C** *36002 to 59999* **	UDP **Y_E** *36000 to 36001* **
	Assent RTCP (traversal media)	UDP **Y_C** *36002 to 59999* **	UDP **Y_E** *36000 to 36001* **

R_C = Protocols > H.323 > Gatekeeper > Registration UDP port: *default = 1719*

P = Protocols > H.323 > Gatekeeper > Call signaling port range start to end: *default = 15000 to 19999*

D = Zones > Traversal Zone > H.323 port, typically *6001* for first traversal zone, 6002 for second etc.

M = Protocols > H.323 Call signaling TCP port: *default = 1720*

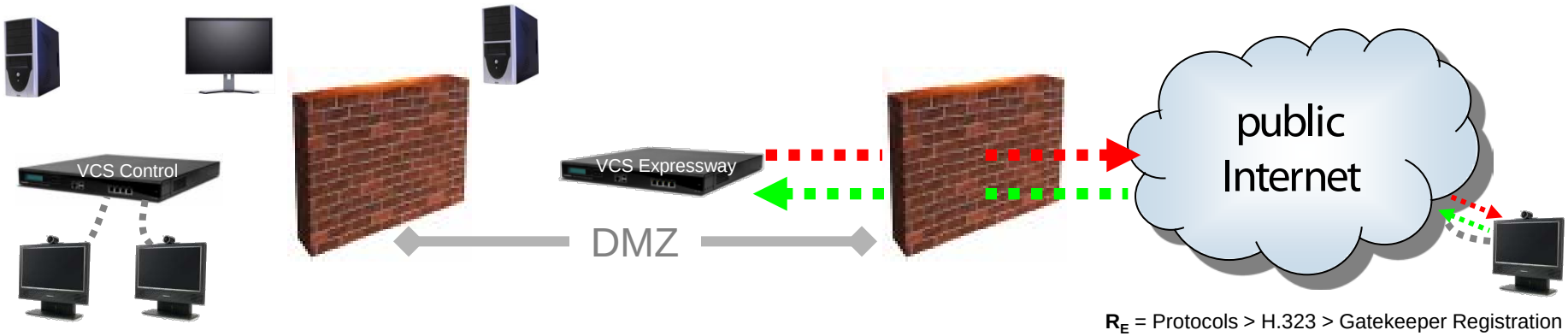
U = Traversal > Ports > H.323 H.460.18 call signaling port: *default = 2777*

Y_C = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Control): *default = 36000 to 59999* **

Y_E = Local Zone < Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway) : *default = 36000 to 59999* **

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

H.323 call with registered endpoint with public IP address

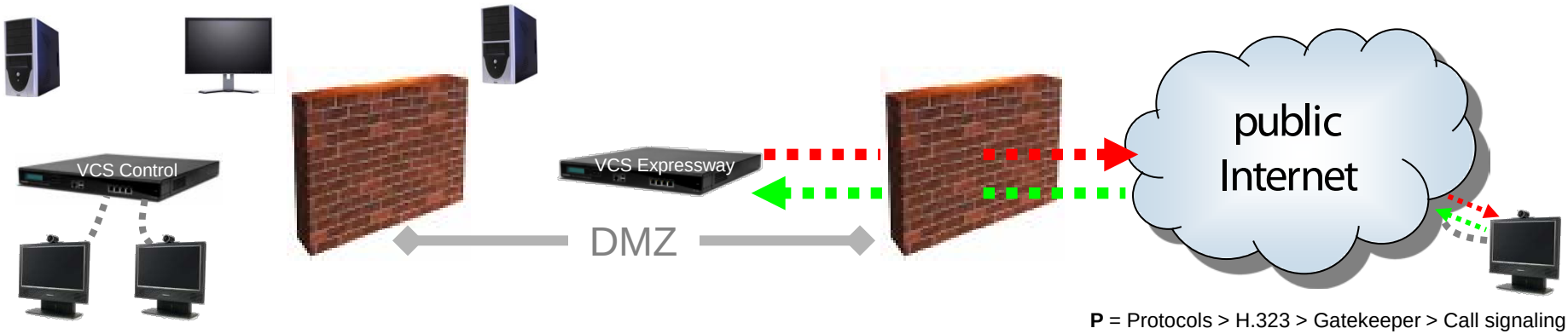


		VCS Expressway source port	Internet endpoint server (listening) port	VCS Expressway server (listening) port	Internet endpoint source port
Call direction		Outbound to an endpoint in the Internet		Inbound from an endpoint in the Internet	
Open firewall		DMZ to Internet		Internet to DMZ	
IP address		IP address of VCS Expressway	Any IP address	IP address of VCS Expressway	Any IP address
IP Ports	Initial RAS connection	-	-	UDP **R_E** *1719*	UDP **J** *1719*
	Q 931 / H.225 signaling	TCP **P** *15000 to 19999*	TCP **G** *1720*	TCP **M** *1720*	TCP **K** *1720*
	H.245	TCP **P** *15000 to 19999*	TCP **H** *>= 1024*	TCP **P** *15000 to 19999*	TCP **H** *>= 1024*
	RTP	UDP **Y_E** *36000 to 59999* **	UDP **E** *>= 1024*	UDP **Y_E** *36000 to 59999* **	UDP **E** *>= 1024*
	RTCP	UDP **Y_E** *36000 to 59999* **	UDP **E** *>= 1024*	UDP **Y_E** *36000 to 59999* **	UDP **E** *>=1024*

R_E = Protocols > H.323 > Gatekeeper Registration > UDP port, *default = 1719*
J = Endpoint RAS source port, typically *1719*
P = Protocols > H.323 > Gatekeeper > Call signaling port range start to end: *default = 15000 to 19999*
G = Endpoint signaling port, specified in registration: any port >= 1024, typically *1720*
M = Protocols > H.323 Call signaling TCP port: *default = 1720*
K = Endpoint signaling port: any port >= 1024, typically *1720*
H = Endpoint H.245 signaling port:
= any IP port >= *1024*
= 15000 to 19999 to another VCS
= 5555 to 5574 for MXP static setting
= 11000 to 65000 for MXP dynamic setting
Y_E = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway): *default = 36000 to 59999* **
E = Endpoint media port range; value used is specified in codec negotiations:
= *any IP port above 1024*
= *36000 to 59999* ** for another VCS
= 2326 to 2385 for MXP static setting
= 11000 to 65000 for MXP dynamic setting

** The default media port range of 36000 – 59999 applies to new installations of X8.1 or later; the previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

H.323 call with a non-registered endpoint with public IP



		VCS Expressway source port	Internet endpoint server (listening) port	VCS Expressway server (listening) port	Internet endpoint source port
Call direction		Outbound to an endpoint in the Internet		Inbound from an endpoint in the Internet	
Open firewall		DMZ to Internet		Internet to DMZ	
IP address		IP address of VCS Expressway	Any IP address	IP address of VCS Expressway	Any IP address
IP Ports	Initial RAS connection	-	-	-	-
	Q 931 / H.225 signaling	TCP **P** *15000 to 19999*	TCP **G** *1720*	TCP **M** *1720*	TCP **K** *1720*
	H.245	TCP **P** *15000 to 19999*	TCP **H** *>= 1024*	TCP **P** *15000 to 19999*	TCP **H** *>= 1024*
	RTP	UDP **Y_E** *36000 to 59999* **	UDP **E** *>= 1024*	UDP **Y_E** *36000 to 59999* **	UDP **E** *>= 1024*
	RTCP	UDP **Y_E** *36000 to 59999* **	UDP **E** *>= 1024*	UDP **Y_E** *36000 to 59999* **	UDP **E** *>=1024*

P = Protocols > H.323 > Gatekeeper > Call signaling port range start to end: *default = 15000 to 19999*

G = Endpoint signaling port, specified by
a) IP Port in call request
b) DNS lookup for URI to call
c) 1720 if IP address but no port specified
Can be: any port >= 1024, typically *1720*

M = Protocols > H.323 Call signaling TCP port: *default = 1720*

K = Endpoint signaling port: any port >= 1024, typically *1720*

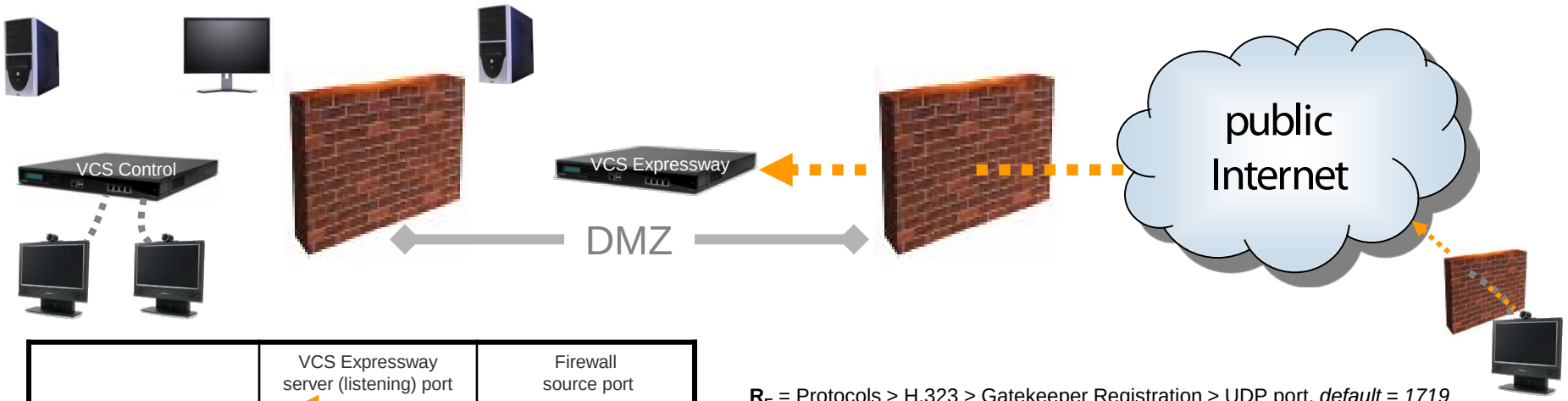
H = Endpoint H.245 signaling port:
= any IP port >= *1024*
= 15000 to 19999 to another VCS
= 5555 to 5574 for MXP static setting
= 11000 to 65000 for MXP dynamic setting

Y_E = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway): *default = 36000 to 59999* **

E = Endpoint media port range; value used is specified in codec negotiations:
= *any IP port above 1024*
= *36000 to 59999* ** for another VCS
= 2326 to 2385 for MXP static setting
= 11000 to 65000 for MXP dynamic setting

** The default media port range of 36000 – 59999 applies to new installations of X8.1 or later; the previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

H.323 call with endpoint supporting Assent behind firewall



		VCS Expressway server (listening) port ←	Firewall source port →
Call direction		Inbound from or outbound to an endpoint in the Internet behind a firewall	
Open firewall		Internet to DMZ	
IP address		IP address of VCS Expressway	Any IP address
IP Ports	Initial RAS connection	UDP **R_E** *1719*	UDP **Q** *>=1024*
	Q 931 / H.225 signaling	TCP **T** *2776*	TCP **Q** *>=1024*
	H.245	TCP **T** *2776*	TCP **Q** *>=1024*
	RTP	UDP **Y_E** *36000 to 36001 ***	UDP **N** *>=1024*
	RTCP	UDP **Y_E** *36000 to 36001 ***	UDP **N** *>=1024*

R_E = Protocols > H.323 > Gatekeeper Registration > UDP port, *default = 1719*

Q =Egress IP port from far end non-H.323 aware firewall: any port >= *1024*

T = Traversal > Ports > H.323 Assent call signaling port: *default = 2776*

Y_E = Local Zone < Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway) : *default = 36000 to 59999* **

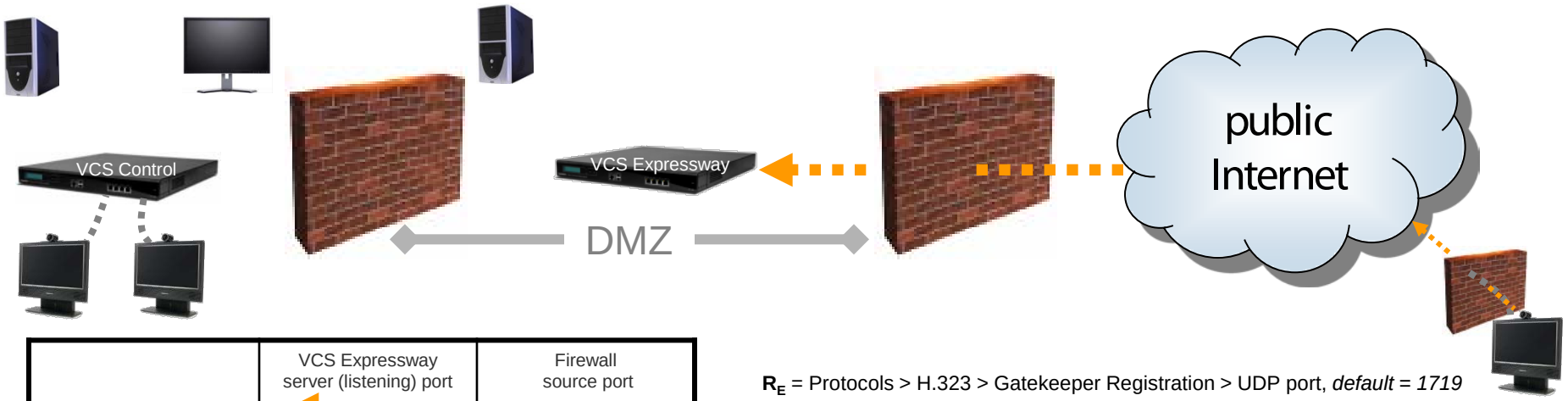
N = Egress IP port of media from far end non-H.323 aware firewall: any port >= *1024*

For calls made from the VCS Expressway to the endpoint:

1. VCS Expressway sends a message to the endpoint using the return path of the established RAS (registration) connection
2. The endpoint then makes a TCP connection out through its firewall to the VCS Expressway (port **T** - 2776 must be open on the firewall local to the VCS Expressway)
3. Any further connections required (e.g. H.245) are requested by the VCS Expressway over the established TCP connection, and the endpoint initiates them (to port **T** - 2776)

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

H.323 call with endpoint supporting H.460.18 / 19 non-mux media



		VCS Expressway server (listening) port	Firewall source port
		←	→
Call direction		Inbound from or outbound to an endpoint in the Internet behind a firewall	
Open firewall		Internet to DMZ	
IP address		IP address of VCS Expressway	Any IP address
IP Ports	Initial RAS connection	UDP **R_E** *1719*	UDP **Q** *>=1024*
	Q 931 / H.225 signaling	TCP **M** *1720*	TCP **Q** *>=1024*
	H.245	TCP **U** *2777*	TCP **Q** *>=1024*
	RTP	UDP **Y_E** *36002 to 59999* **	UDP **N** *>=1024*
	RTCP	UDP **Y_E** *36002 to 59999* **	UDP **N** *>=1024*

R_E = Protocols > H.323 > Gatekeeper Registration > UDP port, *default = 1719*

Q =Egress IP port from far end non-H.323 aware firewall: any port >= *1024*

M = Protocols > H.323 Call signaling TCP port: *default = 1720*

U = Traversal > Ports > H.323 H.460.18 call signaling port: *default = 2777*

Y_E = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway): *default = 36000 to 59999* **

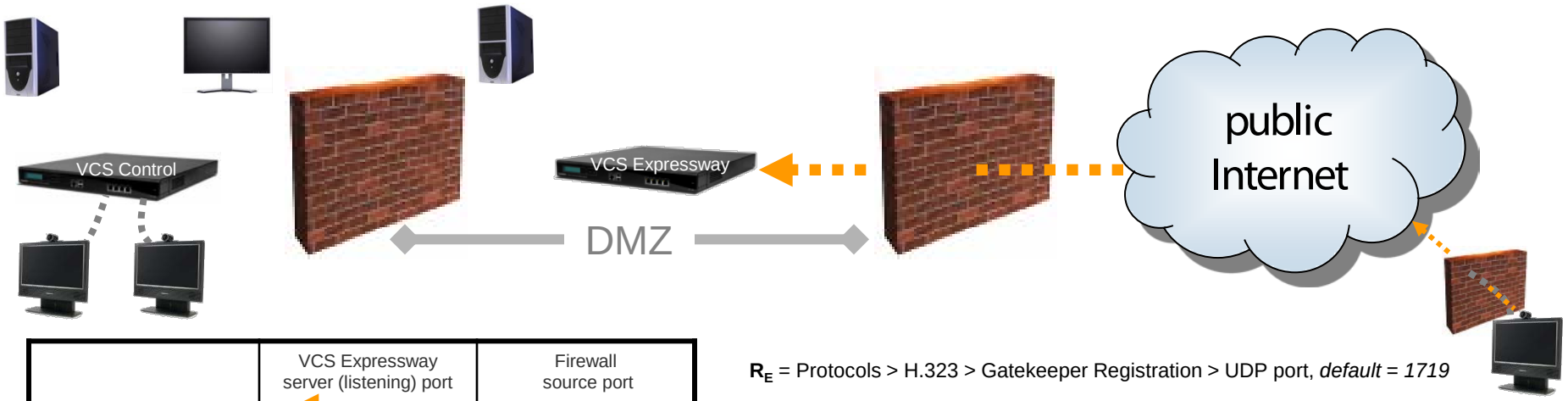
N = Egress IP port of media from far end non-H.323 aware firewall: any port >= *1024*

For calls made from the VCS Expressway to the endpoint:

1. VCS Expressway sends a message to the endpoint using the return path of the established RAS (registration) connection
2. The endpoint then makes a TCP connection out through its firewall to the VCS Expressway (port **M** - 1720 must be open on the firewall local to the VCS Expressway)
3. Any further connections required (e.g. H.245) are requested by the VCS Expressway over the established TCP connection, and the endpoint initiates them (to port **U** - 2777)

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

H.323 call with endpoint supporting H460.18 / 19 multiplexed media



		VCS Expressway server (listening) port	Firewall source port
Call direction		Inbound from or outbound to an endpoint in the Internet behind a firewall	
Open firewall		Internet to DMZ	
IP address		IP address of VCS Expressway	Any IP address
IP Ports	Initial RAS connection	UDP $\mathbf{R_E}$ *1719*	UDP **Q** *>=1024*
	Q 931 / H.225 signaling	TCP **M** *1720*	TCP **Q** *>=1024*
	H.245	TCP **U** *2777*	TCP **Q** *>=1024*
	RTP	UDP $\mathbf{Y_E}$ *36000 to 36001 ***	UDP **N** *>=1024*
	RTCP	UDP $\mathbf{Y_E}$ *36000 to 36001 ***	UDP **N** *>=1024*

$\mathbf{R_E}$ = Protocols > H.323 > Gatekeeper Registration > UDP port, *default = 1719*

Q = Egress IP port from far end non-H.323 aware firewall: any port >= *1024*

M = Protocols > H.323 Call signaling TCP port: *default = 1720*

U = Traversal > Ports > H.323 H.460.18 call signaling port: *default = 2777*

$\mathbf{Y_E}$ = Local Zone < Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway) : *default = 36000 to 59999 ***

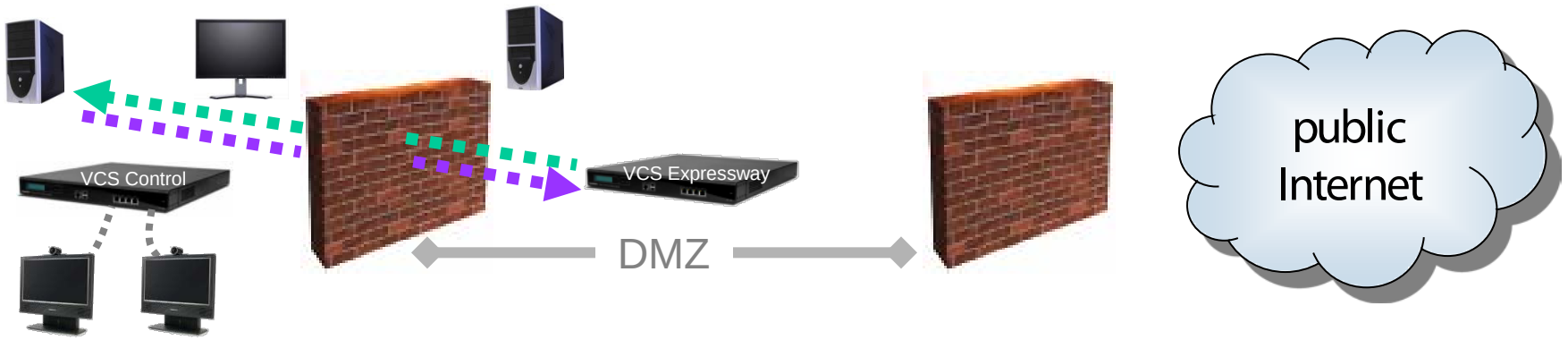
N = Egress IP port of media from far end non-H.323 aware firewall: any port >= *1024*

For calls made from the VCS Expressway to the endpoint:

1. VCS Expressway sends a message to the endpoint using the return path of the established RAS (registration) connection
2. The endpoint then makes a TCP connection out through its firewall to the VCS Expressway (port **M** - 1720 must be open on the firewall local to the VCS Expressway)
3. Any further connections required (e.g. H.245) are requested by the VCS Expressway over the established TCP connection, and the endpoint initiates them (to port **U** - 2777)

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

SIP/H.323 Authentication: Cisco VCS Expressway



		PC listening port	VCS Expressway source port
Management control		DMZ to private	
Open firewall		DMZ to private	
IP address		IP address of management computer(s)	IP address of VCS Expressway
IP Ports	H.350	TCP **389 or 636** *389 or 636*	TCP **Ue** *30000 to 35999 **
	Active Directory direct	UDP **53** UDP **88** TCP **88** UDP **389** TCP **389 or 636** TCP **445 or 139** *53, 88, 389 or 636, 445 or 139*	UDP **Ve** *30000 to 35999 ** TCP **Ue** *30000 to 35999 **

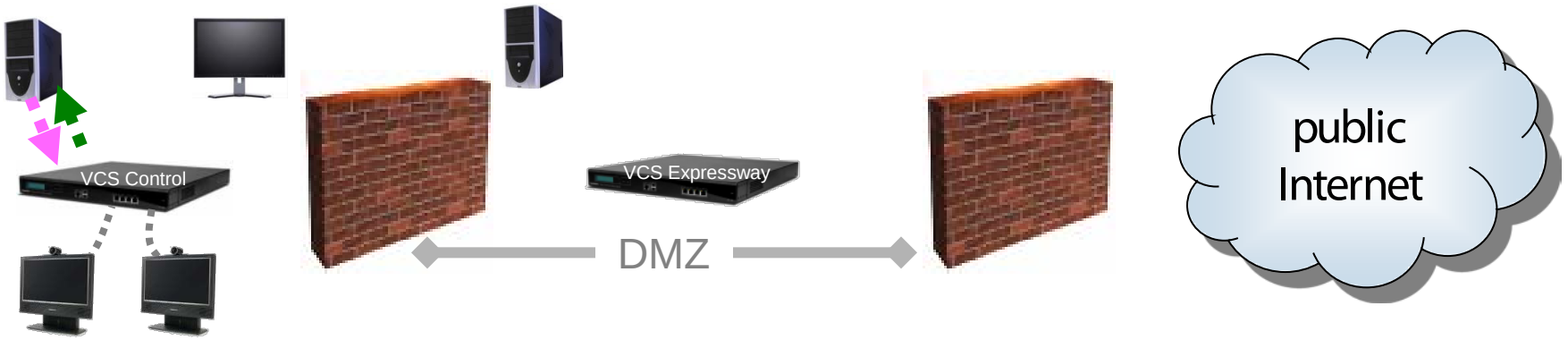
Management ports
… only open ports for the management methods to be used

Ue = VCS TCP ephemeral port range defaults to 30000 to 35999 *

Ve = VCS UDP ephemeral port range defaults to 30000 to 35999 *

* The default ephemeral port range of 30000 – 35999 applies to new installations of X8.1 or later; the previous default range of 40000 - 49999 still applies to earlier releases that have upgraded to X8.1.

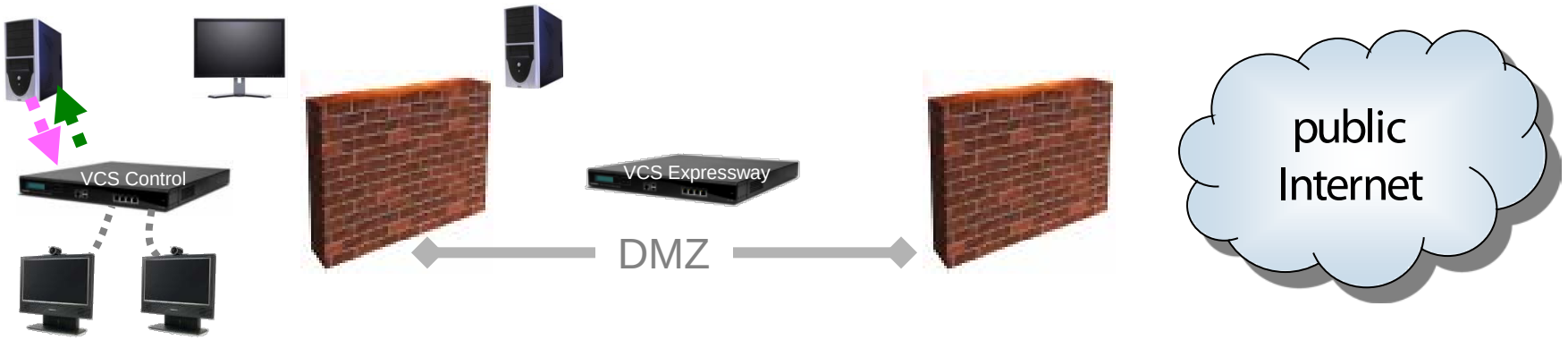
Administration: Cisco VCS Control



		Management system source port	VCS Control listening port
Management control		Private network	
Open firewall		n/a	
IP address		IP address of management computer(s)	IP address of VCS Control
IP Ports	http	TCP **S** *>= 1024*	TCP **80** *80*
	https	TCP **S** *>= 1024*	TCP **443** *443*
	ssh	TCP **S** *>= 1024*	TCP **22** *22*
	SNMP	UDP **S** *>= 1024*	UDP **161** *161*

S = Source port , typically >= 1024

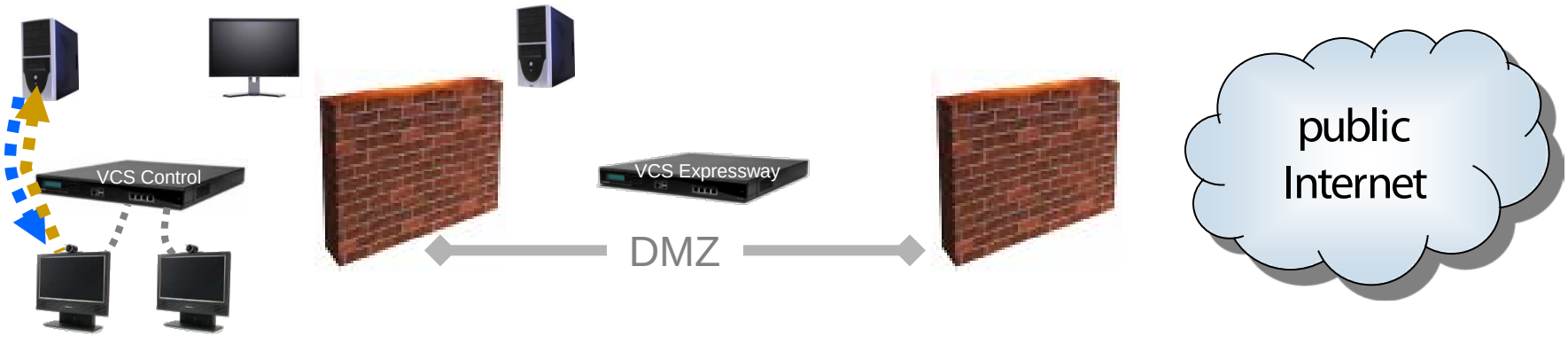
Administration: Cisco VCS Control



		Management system listening port	VCS Control source port
Management control		Private network	
Open firewall		n/a	
IP address		IP address of management computer(s)	IP address of VCS Control
IP Ports	NTP	UDP **123** *123*	UDP **123** *123*
	LDAP	TCP **389** *389*	TCP **S** *>= 1024*
	http (feedback to TMS)	TCP **80** *80*	TCP **S** *>= 1024*
	DNS	UDP **53** *53*	UDP **S** *>= 1024*

S = Source port , typically >= 1024

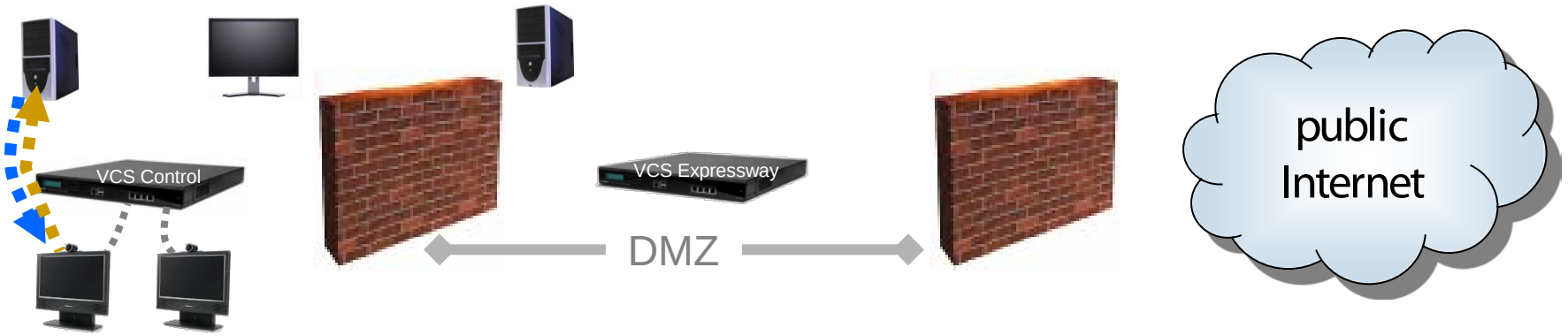
Administration: local endpoint



		Management system source port	Endpoint listening port
Management control		Private network	
Open firewall		n/a	
IP address		IP address of management computer(s)	IP address of Endpoint
IP Ports	http	TCP **S** *>= 1024*	TCP **80** *80*
	https	TCP **S** *>= 1024*	TCP **443** *443*
	ssh	TCP **S** *>= 1024*	TCP **22** *22*
	telnet	TCP **S** *>= 1024*	TCP **23** *23*
	SNMP	UDP **S** *>= 1024*	UDP **161** *161*

S = Source port , typically >= 1024

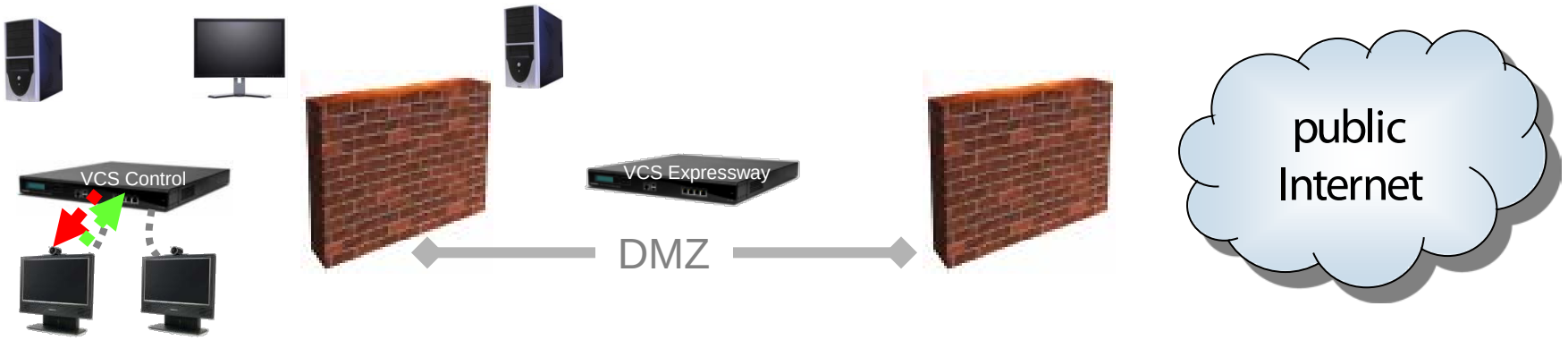
Administration: local endpoint



		Management system source port	VCS Control source port
Management control		Private network	
Open firewall		n/a	
IP address		IP address of management computer(s)	IP address of VCS Control
IP Ports	NTP	UDP **123** *123*	UDP **123** *123*
	http (feedback to TMS)	TCP **80** *80*	TCP **S** *>= 1024*
	DNS	UDP **53** *53*	UDP **S** *>= 1024*

S = Source port , typically >= 1024

SIP: internal



		VCS Control source port	Endpoint listening port	VCS Control listening port	Endpoint source port
		→	→	←	←
Call direction		VCS Control to endpoint		Endpoint to VCS Control	
Open firewall		n/a		n/a	
IP address		IP address of VCS Control	IP address of endpoint	IP address of VCS Control	IP address of endpoint
IP Ports	SIP signaling	UDP **C** *5060* TCP & TLS **A** *25000 to 29999*	UDP & TCP & TLS **F** *5060 or >= 1024*	UDP: **C** *5060* TCP: **K** *5060* TLS: **L** *5061*	UDP **G** *5060 or >= 1024* TCP & TLS **H** *>= 1024*
	RTP	UDP **Y_C** *36002 to 59999* **	UDP **E** *>= 1024*	UDP **Y_C** *36002 to 59999* **	UDP **E** *>= 1024*
	RTCP	UDP **Y_C** *36002 to 59999* **	UDP **E** *>= 1024*	UDP **Y_C** *36002 to 59999* **	UDP **E** *>=1024*

C = Protocols > SIP > UDP port: *default = 5060*

A = Protocols > SIP > TCP Outbound port start to end: *default = 25000 to 29999*

F = defined by endpoint's registration (or if call is to a non-registered endpoint, IP port is defined by DNS lookup) any port >= *1024*, often 5060 for UDP

K = Protocols > SIP > TCP port: *default = 5060*

L = Protocols > SIP > TLS port: *default =5061*

G = any port >= *1024*, often 5060 for hard endpoints

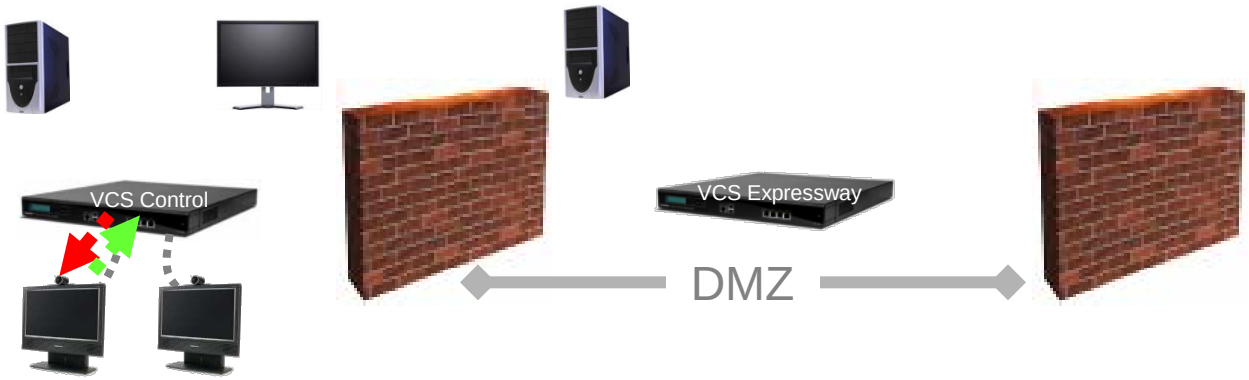
H = any port >= *1024*

Y_C = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Control): *default = 36000 to 59999* **

E = Endpoint media port range; value used is specified in the SDP:
= *any IP port above 1024*
= *36000 to 59999* ** for another VCS
= 2326 to 2385 for MXP static setting
= 11000 to 65000 for MXP dynamic setting

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

H.323: internal



		VCS Control source port	Endpoint listening port	VCS Control listening port	Endpoint source port
		→	→	←	←
Call direction		VCS Control to endpoint		Endpoint to VCS Control	
Open firewall		n/a		n/a	
IP address		IP address of VCS Control	Any IP address	IP address of VCS Control	Any IP address
IP Ports	Initial RAS connection	-	-	UDP **R_C** *1719*	UDP **J** *1719*
	Q 931 / H.225 signaling	TCP **P** *15000 to 19999*	TCP **G** *1720*	TCP **M** *1720*	TCP **K** *1720*
	H.245	TCP **P** *15000 to 19999*	TCP **H** *>= 1024*	TCP **P** *15000 to 19999*	TCP **H** *>= 1024*
	RTP	UDP **Y_C** *36002 to 59999* **	UDP **E** *>= 1024*	UDP **Y_C** *36002 to 59999* **	UDP **E** *>= 1024*
	RTCP	UDP **Y_C** *36002 to 59999* **	UDP **E** *>= 1024*	UDP **Y_C** *36002 to 59999* **	UDP **E** *>=1024*

R_C = Protocols > H.323 > Gatekeeper Registration > UDP port, *default = 1719*

J = Endpoint RAS source port, typically *1719*

P = Protocols > H.323 > Gatekeeper > Call signaling port range start to end: *default = 15000 to 19999*

G = Endpoint signaling port, specified in registration: any port >= 1024, typically *1720*

M = Protocols > H.323 Call signaling TCP port: *default = 1720*

K = Endpoint signaling port: any port >= 1024, typically *1720*

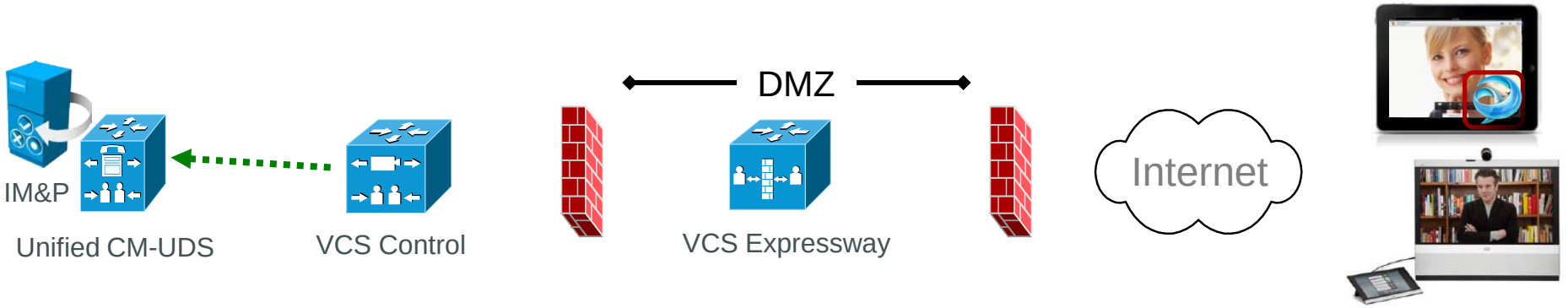
H = Endpoint H.245 signaling port:
= any IP port >= *1024*
= 15000 to 19999 to another VCS
= 5555 to 5574 for MXP static setting
= 11000 to 65000 for MXP dynamic setting

Y_C = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Control): *default = 36000 to 59999* **

E = Endpoint media port range; value used is specified in codec negotiations:
= *any IP port above 1024*
= *36000 to 59999* ** for another VCS
= 2326 to 2385 for MXP static setting
= 11000 to 65000 for MXP dynamic setting

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

Unified Communications : VCS Control to Unified CM, IM&P

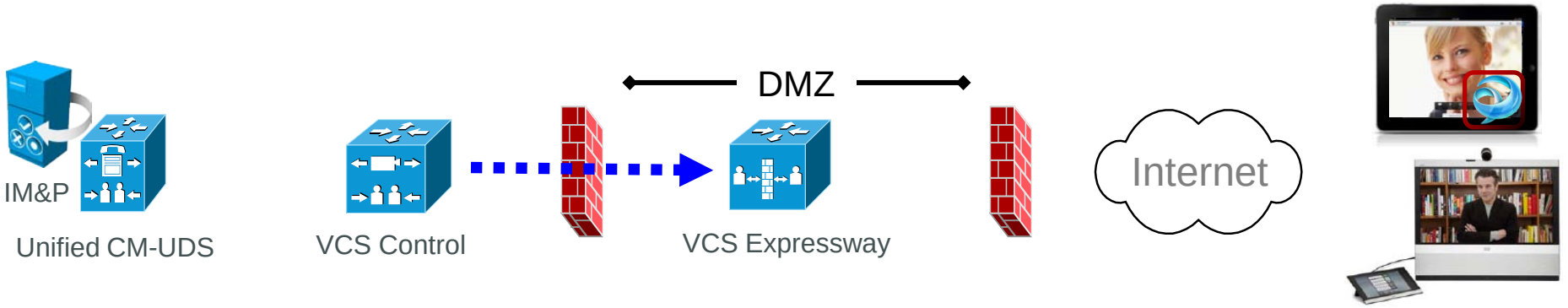


		Management system listening port	VCS Control source port
Management control		Private network	
Open firewall		n/a	
IP address		IP address of Unified CM, IM and Presence servers and CUC	IP address of VCS Control
IP Ports	XMPP (IM and Presence)	TCP 7400 (IM&P server)	TCP **Ue** *30000 to 35999* *
	UDS (provisioning and phonebook)	TCP 8443 (Unified CM server)	TCP **Ue** *30000 to 35999* *
	HTTP (configuration file retrieval)	TCP 6970 (Unified CM server)	TCP **Ue** *30000 to 35999* *
	CUC (voicemail)	TCP 443 (CUC server)	TCP **Ue** *30000 to 35999* *

Ue = VCS TCP ephemeral port range defaults to *30000 – 35999* *

* The default range of 30000 – 35999 applies to new installations of X8.1 or later; the previous default range of 40000 - 49999 still applies to earlier releases that have upgraded to X8.1.

Unified Communications : Control (private) to Expressway (DMZ)



		VCS Control source port	VCS Expressway server (listening) port
Message direction		Inbound and outbound calls	
Open firewall		Private to DMZ	
IP address		IP address of VCS Control	IP address of VCS Expressway
IP Ports	XMPP (IM and Presence)	TCP **Ue** *30000 to 35999 **	TCP 7400
	SSH (HTTP/S tunnels)	TCP **Ue** *30000 to 35999 **	TCP 2222
	SIP signaling	TCP & TLS **A** *25000 to 29999*	TCP and TLS **B** *7001*
	SIP media	UDP $\mathbf{Y_C}$ *36002 to 59999* **	UDP $\mathbf{Y_E}$ *36000 to 36001* **
	TURN server control	UDP *>= 1024*	UDP *3478 (to 3483)* ***R***

A = Protocols > SIP > TCP Outbound port start to end: *default = 25000 to 29999*

B = Zones > Traversal Client > SIP port, typically *7001* for first traversal zone, *7002* for second etc.

R = On Large VM server deployments you can configure a range of TURN request listening ports

Ue = VCS TCP ephemeral port range defaults to *30000 to 35999* *

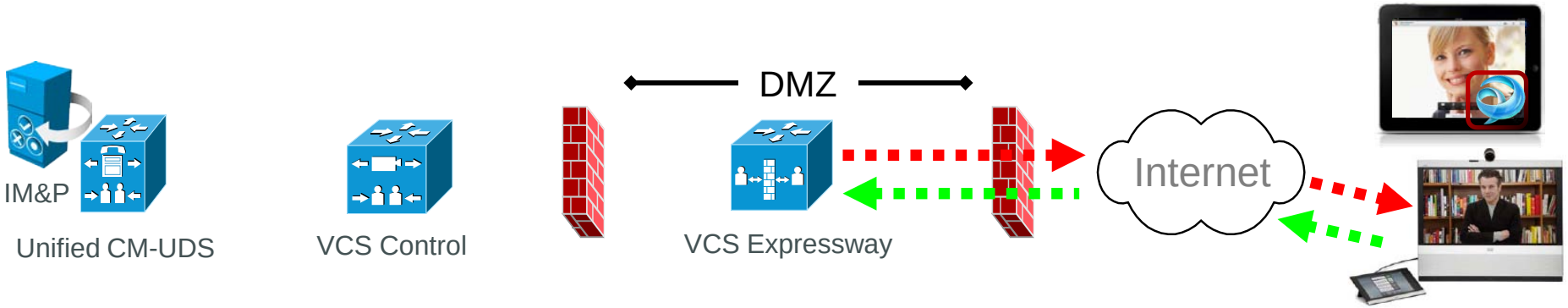
$\mathbf{Y_C}$ = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Control): *default = 36000 to 59999* **

$\mathbf{Y_E}$ = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway): *default = 36000 to 59999* **

* The default ephemeral port range of 30000 – 35999 applies to new installations of X8.1 or later; the previous default range of 40000 - 49999 still applies to earlier releases that have upgraded to X8.1.

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

Unified Communications: Expressway (DMZ) to public internet



		VCS Expressway source port	Internet endpoint server (listening) port	VCS Expressway server (listening) port	Internet endpoint source port
Message direction		Outbound to an endpoint in the Internet		Inbound from an endpoint in the Internet	
Open firewall		DMZ to Internet		Internet to DMZ	
IP address		Address of VCS Expressway	Any IP address	Address of VCS Expressway	Any IP address
IP Ports	XMPP (IM and Presence)	n/a	n/a	TCP *5222*	TCP **S** *>= 1024*
	UDS (phonebook and provisioning)	n/a	n/a	TCP *8443*	TCP **S** *>= 1024*
	TURN server control / media	n/a	n/a	UDP *3478 (to 3483)* **R** / *24000 to 29999* *	UDP **S** *>= 1024*
	SIP signaling	TLS *25000 to 29999*	TLS **S** *>= 1024*	TLS *5061*	TLS **S** *>= 1024*
	SIP media	UDP $\mathbf{Y_E}$ *36002 to 59999* **	UDP **N** *>= 1024*	UDP $\mathbf{Y_E}$ *36002 to 59999* **	UDP **N** *>= 1024*

N = VCS waits until it receives media, then it sends its media to the IP port from which the media was received (egress port of the media from the far end non SIP-aware firewall): any port >= *1024*

R = On Large VM server deployments you can configure a range of TURN request listening ports

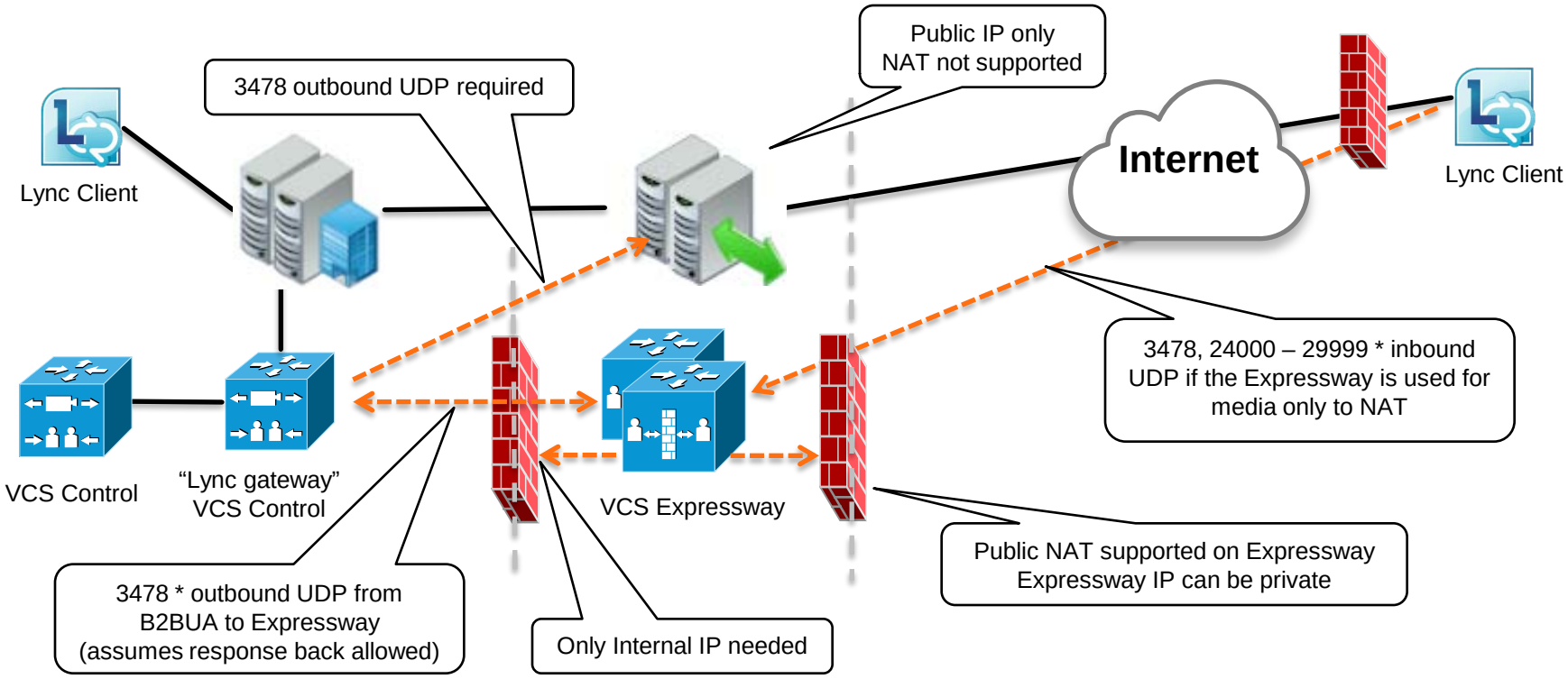
S = Source port , typically >= 1024

$\mathbf{Y_E}$ = Local Zone > Traversal Subzone > Traversal Media port start to end (configured on VCS Expressway): *default = 36000 to 59999* **

* For new installations of X8.1 or later, the default range for TURN relay media ports is 24000 – 29999. The previous default range of 60000 – 61799 still applies to earlier releases that have upgraded to X8.1.

** The default media port range of 36000 to 59999 applies to new installations of X8.1 or later. The first 2 ports in the range are used for multiplexed traffic only (with Large VM deployments the first 12 ports in the range – 36000 to 36011 – are used). The previous default range of 50000 - 54999 still applies to earlier releases that have upgraded to X8.1.

SIP B2BUA and Microsoft Lync



* On Large VCS VM server deployments you can configure a range of TURN request listening ports (*3478 to 3483)* . For new installations of X8.1 or later, the default range for TURN relay media ports is 24000 – 29999. The previous default range of 60000 – 61799 still applies to earlier releases that have upgraded to X8.1.

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