Understand Unified Wireless Network Protocol and Port Matrix

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Introduction

This document describes information about port numbers used by the Unified Wireless solution (CUWN WLC).

Background Information

The main purpose of this document is to provide a consolidated source of communication protocols that incorporate a CUWN solution. Goals are to implement appropriate firewall and security policies based on this information to properly secure the CUWN infrastructure.

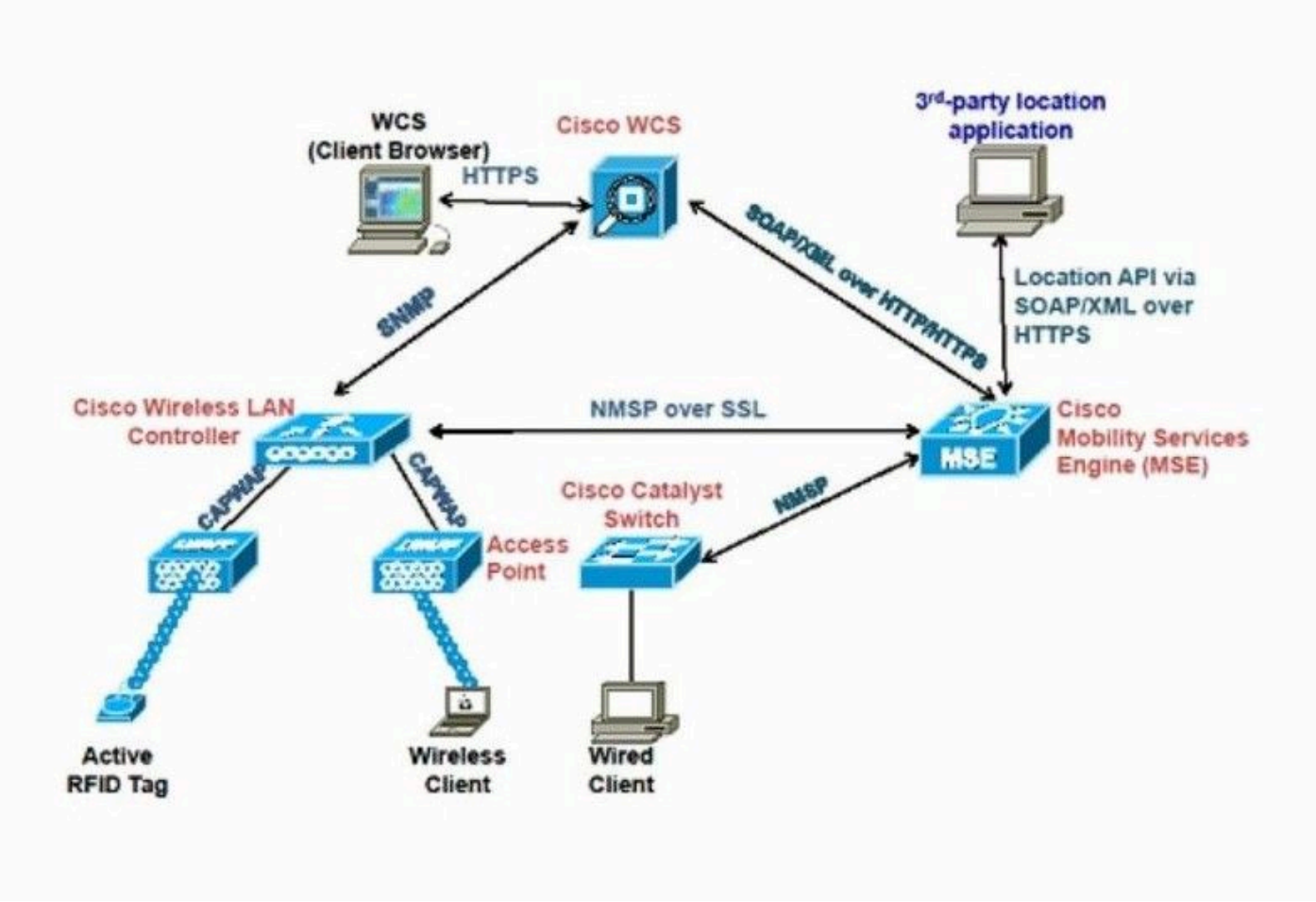
Terms Used

Here is a list of terms used in this document:

- Wireless Control System - WCS
- Network Control System - NCS
- Cisco Prime Infrastructure - PI
- Wireless LAN Controller - WLC
- Mobility Services Engine - MSE
- Operating System - OS
- Access Point - AP
- Secure Shell - SSH
- Simple Mail Transfer Protocol - SMTP
- Authentication, Authorization, and Accounting - AAA
- Domain Name System - DNS
- Identity Services Engine - ISE
- Network Time Protocol - NTP
- Simple Object Access Protocol - SOAP

- High Availability - HA
- Quality of Service - QoS
- Database - DB
- Remote Desktop Protocol - RDP
- Virtual Network Computing - VNC
- Transport Layer Security - TLS
- Cisco Location Control Protocol - LOCP
- Internet Control Message Protocol - ICMP
- Simple Network Management Protocol - SNMP
- Network Mobility Services Protocol - NMSP
- Adaptive Wireless Intrusion Prevention System - AwIPS
- Ethernet over IP - EoIP
- Rogue Location Discovery Protocol - RDLP
- Control and Provisioning of Wireless Access Points - CAPWAP
- Light Weight Access Point Protocol - LWAPP
- Network Spectrum Interface - NSI
- OfficeExtend Access Point - OEAP

Network Overview



Network Diagram

Protocol and Port Number Information

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Table 1. WCS/NCS/PI Protocols and Ports

WCS/NCS/PI Protocols				
Source Device	**Destination Device**	**Protocol**	**Destination Port**	**Description**
WCS/NCS/PI	WLC and MSE	TCP	21	FTP - Used to transfer files to/from devices
Various Management Stations	WCS Host Server OS-Linux	TCP	22	SSH - Used for remote Linux Host Access
WCS/NCS/PI	Cisco aIOS® AP	TCP	23	Telnet - Used for Cisco aIOS AP Configuration
WCS/NCS/PI	SMTP mail servers	TCP	25	SMTP - used for fault notifications
AAA Servers/ISE	WCS/NCS/PI	TCP/UDP	49	TACACS+
WCS/NCS/PI	aIOS AP	UDP	53	DNS - used for Cisco aIOS AP Configuration
WLC	WCS/NCS/PI	UDP	69	TFTP - Used to transfer files to/from devices
Various Management Stations	WCS/NCS/PI	TCP	80	HTTP (Configurable at install time)
NTP Server	WLC	UDP	123	NTP
WLC and MSE	WCS/NCS/PI	UDP	161	SNMP discovery, inventory Cisco aIOS AP and others

WLC and MSE	WCS/NCS/PI	UDP	162	SNMP Trap Receiver
Various Management Stations	WCS/NCS/PI	TCP	443	HTTPS (Configurable at install time)
MSE	WCS/NCS/PI	TCP	443	SOAP/XML (SOAP used for MSE Management
WLC	WCS/NCS/PI	UDP	514	Syslog (Optional)
Local only	WCS/NCS/PI	TCP	1299	RMI Registry port (local only)
HA Server and Various others	WCS/NCS/PI	TCP	1315	Database Server HA (QoS)
WCS HA Server	WCS/NCS/PI	TCP	1316-1320	HA DB Ports
AAA Servers/ISE	WCS/NCS/PI	UDP	1812/1645	RADIUS
AAA Servers/ISE	WCS/NCS/PI	UDP	1813/1646	RADIUS
Various Management Stations	WCS Host Server OS-Microsoft Windows	TCP/UDP	3389	RDP - Microsoft Windows Remote Desktop (Optional)
Various	WCS/NCS/PI	TCP	5001	Apache Axis SOAP Monitoring: Java Listener
Various Management Stations	WCS Host Server OS-Microsoft Windows	TCP	5500	VNC - (Optional) Used for remote Microsoft Windows Host Access
Various Management Stations	WCS Host Server OS-Microsoft Windows	TCP	5800	VNC - (Optional) Used for remote Microsoft Windows Host Access
Various Management Stations	WCS Host Server OS-Microsoft Windows	TCP/UDP	5900	VNC - (Optional) Used for remote Microsoft Windows Host Access

Local only	WCS/NCS/PI	TCP	6789	RMI Server Port (local only)
MSE - Location Appliance	WCS/NCS/PI	TCP	8001	Location Server Data Sync. Communication Port
Local only	WCS/NCS/PI	TCP	8005	Tomcat Shutdown Port
Local only	WCS/NCS/PI	TCP	8009	Web Server/Java Server Connector (local only)
HA Web Server	WCS/NCS/PI	TCP	8082	HA Web Server Port: Health Monitor for WCS HA
Various Management Stations	WCS/NCS/PI	TCP	8456	HTTP Connector
Various Management Stations	WCS/NCS/PI	TCP	8457	HTTP Redirect
Various Management Stations	WCS/NCS/PI	TCP	16113	LOCP TLS Port
WLC	WCS/NCS/PI	UDP	29001-29005	TFTP Child threads
Various	AP	ICMP		ICMP - Optional
WLC	CMX 10.2.X	NMSP, AoA, 80, 443, 161,162	16113, 2003, HTTP, HTTPS, ICMP, SNMP	

Table 2. MSE - AwIPS Protocols

MSE - AwIPS Protocols				
Source Device	**Destination Device**	**Protocol**	**Destination Port**	**Description**

WCS/NCS/PI	MSE	TCP	21	FTP - Used to transfer files to/from devices
Various Management Stations	MSE Host Server OS-Linux	TCP	22	SSH - Used for remote Linux Host Access
WCS/NCS/PI	MSE	TCP	80	HTTP (Configurable at install time)
NTP Server	WLC	UDP	123	NTP
WCS/NCS/PI	MSE	UDP	161	SNMP
MSE	WCS/NCS/PI	UDP	162	SNMP Trap Receiver
WCS/NCS/PI	MSE	TCP	443	HTTPS (Configurable at install time)
WCS/NCS/PI	MSE	TCP	443	SOAP/XML
WCS/NCS/PI	MSE	TCP	8001	HTTPS (Configurable at install time)
WLC	MSE and Spectrum Expert	TCP	16113	NMSP
Various	AP	ICMP		ICMP - Optional

Table 3. MSE - Context Protocols

MSE - Context-Aware and AwIPS Protocols				
Source Device	**Destination Device**	**Protocol**	**Destination Port**	**Description**
WCS/NCS/PI	MSE	TCP	21	FTP - Used to transfer files to/from devices
Various Management Stations	MSE Host Server OS-Linux	TCP	22	SSH - Used for remote Linux Host Access

WCS/NCS/PI	MSE	TCP	80	HTTP (Configurable at install time)
NTP Server	WLC	UDP	123	NTP
WCS/NCS/PI	MSE	UDP	161	SNMP
MSE	WCS/NCS/PI	UDP	162	SNMP Trap Receiver
WCS/NCS/PI	MSE	TCP	443	HTTPS (Configurable at install time)
WCS/NCS/PI	MSE	TCP	443	SOAP/XML
WCS/NCS/PI	MSE	TCP	8001	HTTPS (Configurable at install time)
WLC and Catalyst LAN Switches	MSE and Spectrum Expert	TCP	16113	NMSP
Various	AP	ICMP		ICMP - Optional

Table 4. WLC Protocols

WLC Protocols					
Source Device	**Destination Device**	**Protocol**	**Destination Port**	**Source Port**	**Description**
WCS/NCS/PI	WLC	TCP	21	0:65535	FTP - Used to transfer files to/from devices
WCS and Various Management Stations	WLC	TCP	22	0:65535	SSH - Used for remote Management (Optional)
WCS and Various Management Stations	WLC	TCP	23	0:65535	Telnet - Used for remote Management (Optional)
AAA Servers/ISE	WLC	TCP/UDP	49	0:65535	TACACS+

WCS and Various Management Stations	WLC	UDP	69	0:65535	TFTP - Used to transfer files to/from devices
Various Management Stations	WLC	TCP	80	0:65535	HTTP (Configurable at install time)
WLC	WLC	TCP	91	0:65535	
WLC Mobility Group members	WLC	EoIP IP Protocol 97	EoIP IP Protocol 97	0:65535	EoIP Tunnel - Client Anchor/Tunneling traffic
NTP Server	WLC	UDP	123	0:65535	NTP
WCS/NCS/PI	WLC	UDP	161	161	SNMP
WCS/NCS/PI	WLC	UDP	162	0:65535	SNMP Trap Receiver
Various Management Stations	WLC	TCP	443	0:65535	HTTPS (Configurable at install time)
WLC and Various Syslog Servers	WLC	UDP	514	0:65535	Syslog (Optional)
AAA Servers/ISE	WLC	UDP	1812/1645	0:65535	RADIUS
AAA Servers/ISE	WLC	UDP	1813/1646	0:65535	RADIUS
AP	WLC	UDP	6352	0:65535	RDLP
Various Management Stations (MSE, Spectrum Expert)	WLC	TCP	16113	0:65535	LOCP TLS Port NMSP
WLC	WLC	UDP	16666	16666	Mobility - non-secured
WLC	WLC	UDP	16667		Mobility - secured ** In release. 5.2+ feature was removed
AP	WLC	UDP	5246-5247	0:65535	CAPWAP Ctl/Data

AP	WLC	UDP	5248	0:65535	CAPWAP Mcast.
Various	AP	ICMP			ICMP - Optional
mDNS	WLC/network	UDP	5353	0:65535	mDNS
RADIUS server	WLC	UDP	1700	0::65535	CoA radius packets

Table 5. AP Protocols

AP CAPWAP-LWAPP Protocols				
Source Device	**Destination Device**	**Protocol**	**Destination Port**	**Description**
Various	AP	UDP	69	TFTP - used for remote code update
Various	AP	TCP	22	SSH - used for optional remote troubleshooting access. Can be administratively disabled.
Various	AP	TCP	23	Telnet - used for optional remote troubleshooting access. Can be administratively disabled.
AP	DNS Server	TCP/UDP	53	DNS
AP	DHCP Server	UDP	68	DHCP
AP	Various	UDP	514	Syslog - Destination configurable. The default is 255.255.255.255.
WLC	AP	UDP	1024 - 65535*	CAPWAP Ctl/Data
WLC	AP	UDP	5248	CAPWAP Mcast.
AP	WLC	UDP	6352	RDLP
AP	Monitor PC	TCP	37540 for 2.4 GHz 37550 for 5GHz	NSI Protocol for SE-Connect

Various	AP	ICMP		ICMP - Optional
AP	AP	UDP	16670	Client policies (AVC)

* - Arbitrary port number is assigned to every AP from the range 1024 - 65535 when the AP joins the WLC. The WLC uses the number as the Destination Port for CAPWAP Ctl/Data as long as the AP is connected.

Table 6. OEAP600 Firewall Protocols

AP CAPWAP-LWAPP Protocols				
Source Device	**Destination Device**	**Protocol**	**Destination Port**	**Description**
WLC	AP	UDP	5246-5247	CAPWAP Ctl/Data