

3 Phones

How Cisco phone learns voice vlan	CDP at boot time
How phone learns TFTP server	DHCP option 150
What phone gets from TFTP	<ul style="list-style-type: none"> • Phone firmware • Config file
How phone learns IP of call processing agent	Config file via TFTP
How phone learns default gateway	DHCP ("default-router" in pool)
Two possible call processing agents	CME, CUCM
How phone gets DNS server	DHCP ("dns-server" in pool)
How phone gets CUCM/CME TCP port	Config file via TFTP
Vendor neutral signaling protocol	SIP (Session Initiation Protocol)
Cisco session signaling protocol	SCCP (Skinny Client Control Protocol)
L4 protocol atop UDP for audio stream	RTP (Real-time Transport Protocol)
Automatic side-effect of voice vlan	spanning-tree portfast
Name of phone's config file on TFTP	SEP<mac>.cnf.xml
Name of file used if above not found	XMLDefault.cnf.xml
# of hops an NTP server is from atomic	stratum
Protocol for phone to get operating config from CUCM / CME	SCCP or SIP

Standards

802.3 af	PoE
802.1 q	VLAN tagging
Option 150	TFTP server IP

Config Sources

	TFTP	CUCM/CME
Ring Tones		X
DN (directory numbers)		X
Call Proc Server IP+port#	X	
Softkey layout		X
Phone language	X	
Phone firmware version	X	

Acronyms

SCCP	Skinny Client Control Protocol
SIP	Session Initiation Protocol
CME	Communications Manager Express
CUCM	Cisco Unified Communications Manager

Do it

Create a VLAN <ul style="list-style-type: none"> • Number it 10 • Name it Voice 	<pre>vlan 10 name voice</pre>
Set up a switch interface for ip phone. <ul style="list-style-type: none"> • Data on vlan 50 • Phone audio on vlan 10 • Interface ready quickly for fast-booting phones. 	<pre>switchport mode access switchport access vlan 50 switchport voice vlan 10 spanning-tree portfast ! voice vlan might automatically invoke portfast</pre>
DHCP on router <ul style="list-style-type: none"> • 172.16.1.10 / 24 - .255 • gateway .1 • DNS 4.2.2.2 • TFTP 172.16.1.1 	<pre>ip dhcp excluded-address 172.16.1.1 172.16.1.9 ip dhcp pool myPool default-router 172.16.1.1 dns-server 4.2.2.2 option 150 ip 172.16.1.1 network 172.16.1.0 255.255.255.0</pre>
Command to forward DHCP requests to a non-local DHCP server	<pre>ip helper-address 10.0.0.12</pre>
where above command placed	Router Interface or Subinterface closest to client/phone
Set router's timezone to Pacific standard	<pre>clock timezone PST -8</pre>
Tell router to use ntp server 64.209.21.2	<pre>ntp server 64.209.21.2 [prefer]</pre>
Tell to use Daylight Saving automatic	<pre>clock summer-time PDT recurring</pre>
Display NTP sources & statuses	<pre>show ntp associations</pre>
Make router an NTP master, stratum 4	<pre>ntp master 4</pre>

QoS Command Line

Tell switchport to use Auto-Qos for an IP phone	<pre>interface fa0/1 auto qos voip cisco-phone</pre>
Tell switchport to use Auto-Qos for a PC with IP Communicator software	<pre>interface fa0/2 auto qos voip cisco-softphone</pre>
Tell switchport to trust QoS markings coming in from a router uplink	<pre>interface fa0/24 auto qos voip trust</pre>

Quality of Service

QoS Goals—Delay	≤ 150 ms
QoS Goals—Jitter	≤ 30 ms
QoS Goals—Loss	≤ 1 %
Type of QoS that reserves bandwidth end-end w/ scalability and waste problems	IntServ (Integrated Services)
Type of QoS with traffic Classes—Commonly used.	DiffServ
Default QoS handling for ≥ 2 Mbps (ethernet)	Best Effort
L2 QoS Classification Markings	COS (Class of Service)
L3 QoS Classification Markings	TOS (Type of Service)
Queueing Algorithm that balances between queues, thus discriminating against chatty senders whose whole stream ends up in same queue. Tail drop is per-queue. Default for < 2 Mbps (serial)	WFQ (Weighted Fair Queueing)
Queueing Algorithm that guarantees a bandwidth % to various classes of traffic, with rest balanced between senders. User can define classes. Can have unacceptable jitter.	CBWFQ (Class-Based Weighted Fair Queueing)
Queueing Algorithm that is preferred for voice, adds a priority queue, with the rest receiving the above handling	LLQ (Low-Latency Queueing)
Dropping packets to enforce a bandwidth limit	Traffic Policing
Delaying packets to enforce a bandwidth limit	Traffic Shaping