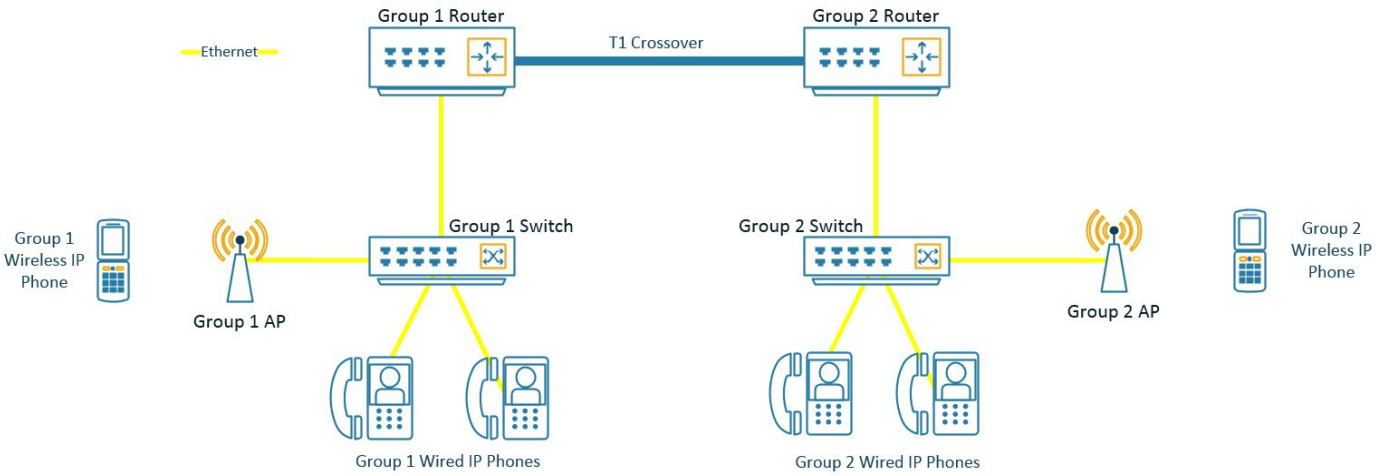
Voice over IP Introduction

IP telephony or Voice over IP (VoIP) is used for voice communications over an IP network. Many protocols have been developed for voice communications which include control protocols and real time data protocols. The main call control protocols are SIP (Session Initiation Protocol), SCCP (Skinny Client Control Protocol), and H.323 (H.323 ITU-T standard), while the main protocol that carries voice data is RTP (Real-time Transport Protocol).

Tonight's Build-It-Night will consist of setting up Cisco Call Manager Express (CME) on a Cisco Router. After you can call between your own phones, you will pair up with another group to make calls to them. Good luck and have fun!

Hints are located in ***Appendix A*** which will be very useful for help if you get stuck!

Topology



Equipment

- 1x 2811 or 2911 Cisco Router
- 1x T1 cards (modules which should already be in the 2811/2911)
- 1x 3550 Cisco Catalyst Switch w/ PoE or Inline Power
- 2x 7961 Cisco IP Phones from the cage
- 2x partners
- 1x Cisco 1142 Access Point
- 1x Cisco 7920 Wireless IP Phone

Router setup

1. Configure your router's interface
2. Setup a DHCP pool for your phones
3. Exclude your router's interface address from the DHCP pool
4. Ensure all ports used are access VLAN 1 on the switch (including the router's connection)

Call Manager setup

1. Enable the telephony service on the router
2. Ensure proper file are in flash
3. Set an address for the service to listen on (router's interface connected to the switch)
4. Create an ephone directory number (DN) for each of your phones
5. Create an ephone for each of your 7961s
6. Plug your phones into the switch
7. Ensure they get an IP address via DHCP and register successfully
8. Call between your local phones

T1 setup

1. Find another group who has made it this far
2. Get a T1 Crossover cable or crimp it
3. Research T1s and how they play into the voice game
4. Connect your T1 interface card to theirs (patch to their bench - only use 1x T1 Crossover)
5. Configure the T1 interface
6. Set up routing between your networks (static or via routing protocol)
7. Ensure you can ping from your network to the other group's

Dial-peer setup

1. Configure a dial-peer
    a. Configure a target IP and destination pattern
2. Try to call the other group

AP setup

1. Configure an SSID (make this unique and easy to type on a phone with t9…)
    a. Make sure it is 802.11b
2. Configure open authentication
3. At this point everything should be on VLAN 1

Wireless IP phone setup

1. Configure CallManager to allow your wireless IP phone to register
2. Power phone on by holding “hangup”
3. Configure phone to know your SSID
    a. Menu -> Profiles -> Select pre existing profile -> 802.11b Configuration
        i. Enter your SSID
        ii. Set authentication method
4. Check that phone is connected to proper SSID
    a. Menu -> Network Config -> 802.11b Configuration -> Associated AP SSID
5. Call from wireless to wired phone

Bonus - PCs behind phones

1. Segment your network into VLANs - data and voice
2. Connect your bench PCs to the back of your phones
3. Ping between your PC and the other group’s PC
    a. *hint - switchport configuration

Appendix A: Hints

Router setup

```
ip dhcp pool phones
      network 172.22.X.0 255.255.255.0
      default-router 172.22.X.254
      option 150 ip 172.22.X.254
      exit
ip dhcp excluded-address 172.22.X.254
```

Call Manager setup

```
telephony-service
      ip source-address 172.22.X.254
      max-ephones 2
      max-dn 2
      load 7961 [filename] (hint check 'File System' below)
      create cnf
!
ip tftp source [INTERFACE NAME]
tftp-server flash:[filename]
!
ephone-dn 1
      number X001
ephone-dn 2
      number X002
!
!
ephone 1
      mac-address XXXX.XXXX.XXXX
      button 1:1
ephone 2
      mac-address ZZZZ.ZZZZ.ZZZZ
      button 1:2
```

T1 setup

```
Controller T1 0/0/0
      framing [framing type]
      linecode [linecode]
      channel-group 1 timeslots ....
```

Dial-peer setup

```
dial-peer voice 1 voip
      Session target ipv4:[IP address]
      destination-pattern 2XXX
```

File system

dir **[devicename]***: (dir flash:)*

Files that you need

flash:TERM41.7-0-3-0S.loads
flash:term41.default.loads
flash:term61.default.loads
flash:Jar41.2-9-2-26.sbn
flash:cnu41.2-7-6-26.sbn
flash:CVM41.2-0-2-26.sbn