Voice over Wireless

Enabling Seamless Mobile Collaboration:

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What is in Your Mobile Workspace?

Mobile Workspaces contain any combination of locations, networks, devices, applications and operating systems.
Fixed Mobile Convergence is the coming together of wireline and wireless technologies at three levels: networks, applications, and devices.

**Collaboration**

Fixed Mobile Convergence as the coming together of wireline and wireless technologies.

**Devices**

- Directory
- Presence
- Single Number
- Location
- Single VoiceMail

**Applications**

**Networks**

- Ethernet
- WLAN
- Cellular
- WiMAX
Cisco Unified Communications over WLAN

Unified Communications over WLAN is a subset of Fixed Mobile Convergence and includes dual-mode and Wi-Fi phones, the WLAN network and a variety of applications.
Worldwide Shipments of WiFi Enabled Phones

Single-mode
- Single-mode phone shipments expected to grow
- Vertical market focus

Single-mode WiFi Worldwide Unit Shipments

<table>
<thead>
<tr>
<th>Year (CY)</th>
<th>Units (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CY05</td>
<td>0.2</td>
</tr>
<tr>
<td>CY06</td>
<td>0.7</td>
</tr>
<tr>
<td>CY07</td>
<td>0.8</td>
</tr>
<tr>
<td>CY08</td>
<td>1.1</td>
</tr>
<tr>
<td>CY09</td>
<td>1.5</td>
</tr>
<tr>
<td>CY10</td>
<td>2.1</td>
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</table>

Dual-mode
- 286M Dual-mode phones expected to ship in CY10
- Mainstream Enterprise focus

Dual-mode WiFi/Cellular Worldwide Unit Shipments

<table>
<thead>
<tr>
<th>Year (CY)</th>
<th>Units (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CY05</td>
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<td>CY06</td>
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<td>CY07</td>
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<td>CY08</td>
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<td>CY09</td>
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</tr>
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<td>CY10</td>
<td>286</td>
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</table>
Mobility TV - FMC Webinar Audience Poll

Drivers for Adoption of Dual-mode
84 Responses

- Access to Enterprise Telephony Features: 39%
- In-Building Coverage: 11%
- Application Integration: 18%
- Cost Reduction for Voice Services: 32%

How important is Seamless Handoff
108 Responses

- Critical - Required for Deployment: 41%
- Important - But won't stop deployment: 41%
- Nice to have: 18%
VoWLAN Client Devices

- Applications
- WLAN Features
- Usage Model

- Various devices representing VoWLAN client devices.
Cisco Unified Wireless Network Voice Services Solution

- Seamless mobile voice communications across the enterprise
- Only end-to-end unified wireline and wireless voice solution
- Rich selection of enterprise-class and industry specific voice clients
- Increased call capacity, higher network availability and improved performance

End to End Intelligent Integration
VoWLAN Cost Drivers

- An integrated wired and wireless LAN can minimize total cost of ownership
Strategies to Minimize TCO

- **Strategic**
  - Managed services
  - Design for voice

- **Tactical**
  - Upfront deployment
  - Leverage tools to manage RF environment
  - Use softphone on existing clients when possible
Voice over WLAN
How to Justify

**Employee Productivity**
- Reduced call backs, fewer call attempts
- Single mailbox, fewer duplicate messages
- Flexibility: choice of device and location for calls

**Customer Satisfaction**
- Increases speed of response
- Flexible communication flow with media choices
- Personalized service

**OPEX Reductions**
- Predictable/controllable cellular expenses
- Least cost routing/Intelligent on corporate network
- Better visibility, better control
Improving Productivity: The Road Warrior Example

Ubiquitous Access to Phone, E-mail, Fax and Voicemail with Unified Messaging and Soft Phone

- Immediate response from 35,000 ft.
- Reduced access complexity through “one-stop” mailbox
- Intelligent routing and prioritization of messages
- Extension portability and “follow me” capabilities
Why Wi-Fi Phone?

<table>
<thead>
<tr>
<th></th>
<th>VoWLAN (C7921)</th>
<th>Radio (Walkie-Talkie)</th>
<th>DECT</th>
<th>Cellular</th>
<th>Dual-mode</th>
</tr>
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<tbody>
<tr>
<td>Toll</td>
<td>Free</td>
<td>Free</td>
<td>Free</td>
<td>Yes</td>
<td>Free</td>
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<tr>
<td>Voice Quality</td>
<td>Excellent</td>
<td>Under moderate</td>
<td>moderate</td>
<td>moderate</td>
<td>moderate</td>
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<tr>
<td></td>
<td>(G.722, 80kbps)</td>
<td></td>
<td>(G.726 32kbps)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coverage</td>
<td>Small</td>
<td>Large</td>
<td>Medium</td>
<td>Large</td>
<td>Small or Large</td>
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<tr>
<td>Application</td>
<td>Native Support</td>
<td>No</td>
<td>Expensive</td>
<td>Expensive</td>
<td>Yes</td>
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<tr>
<td>integrated SMS</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>Excellent</td>
<td>No</td>
<td>moderate</td>
<td>moderate</td>
<td>Excellent</td>
</tr>
<tr>
<td></td>
<td>(AES)</td>
<td></td>
<td>(DES)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTT</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>IP-PBX</td>
<td>Yes</td>
<td>Limited (ex. IPICS)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Integration</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

VoWLAN: VoWLAN (Voiced-VOIP Wireless Local Area Network) is a technology that allows users to make and receive voice calls over a wireless network. It is a Wi-Fi-based service that provides high-quality voice calls, allowing users to make and receive calls from any location within the coverage area.

Radio (Walkie-Talkie): This technology is used for two-way communication over a radio frequency. It is commonly used in environments where a constant line of sight is required, such as construction sites or large industrial facilities.

DECT: Digital Enhanced Cordless Telecommunications is a wireless standard that provides high-quality voice calls over a wireless network. It is commonly used in office environments and is compatible with DECT phones.

Cellular: Cellular networks provide mobile phone services over a wireless network. They are widely used for voice calls, text messages, and data services.

Dual-mode: A dual-mode phone can use both Wi-Fi and cellular networks. This provides flexibility and ensures that calls can be made even when Wi-Fi is not available.

Toll: Toll refers to the cost of using the phone. Free means there is no cost, while Expensive means there is a high cost.

Voice Quality: Excellent, moderate, or under moderate quality. Excellent is the highest quality, while under moderate is the lowest.

Coverage: Small, Large, or Medium coverage area. Free means there is no limitation.

Application Support: Native Support means the application is supported natively by the phone, while No means it is not supported.

Security: Excellent, moderate, or under moderate security. Excellent is the highest security, while under moderate is the lowest.

PTT: Push-to-Talk (PTT) is a voice communication feature that allows users to send and receive voice calls instantly.

IP-PBX Integration: Yes indicate the phone is compatible with an IP-PBX (Private Branch Exchange) system.
Are Wireless LAN’s Ready for Voice?

One Integrated Network

Security

QoS

Roaming

Management
Does It Make Sense to Deploy Products Now?

- Assess and Plan Architecture
- Design for Performance, Scalability, Adaptability, and Upgradability
- Integrate Into Core Network
- Optimize WLAN Performance for VoIP
Fast Secure Roaming with CCKM

- WDS server is the authenticator for the subnet
- AP1 and AP2 authenticates with WDS
- WDS caches the client’s security credentials
- At association, AP1 gets the key materials to derive dynamic keys for session
- At re-association, AP2 gets the key materials to derive dynamic keys for session
- Client authenticates with radius server only once.
Dynamic Transmit Power Control (DTPC)

- Set the same transmit power on the AP and on the phones
  - If using an AP that supports DTPC, then ensure client power matches the local AP power
  - (Do not use default setting of Max power)
  - If the AP does not support DTPC, then need to statically set the phone’s transmit power to match the AP with the highest transmit power in the WLAN

- Prevents one-way audio
  - i.e. RF traffic is only being heard in one direction

50mW 20mW
“Pre-Call” Admission Control

- If Call Admission Control (TSPEC) is enabled on the AP, the Cisco Unified Wireless IP Phone 7921G will send an ADDTS (Add Traffic Stream) to the AP to request bandwidth in order to place or receive a call. If the AP send an ADDTS successful message then the Cisco Unified Wireless IP Phone 7921G will establish the call. If the call is rejected via the AP, then the Cisco Unified Wireless IP Phone 7921G will display “Network Busy” if there are no other APs to roam to.

- The Cisco Unified Wireless IP Phone 7921G can also use QBSS (QoS Basic Service Set) for outbound CAC. If the QBSS threshold is met (i.e. 105), then the call will not be allowed and will display “Network Busy”.

- Cisco Unified CallManager Admission Control (via Locations or Gatekeeper) will be applied if the call-setup is attempted by the Cisco Unified Wireless IP Phone 7921G.
“Mid-Call” Admission Control

- During a call, the Cisco Unified Wireless IP Phone 7921G will factor in Received Signal Strength Indicator (RSSI), QoS Basic Service Set (QBSS), Packet Error Rate (PER) values for all available APs to trigger roaming.

- If the original AP where the call was established had CAC (TSPEC) enabled, then the Cisco Unified Wireless IP Phone 7921G will send a ADDTS request during the roam to the new AP.
Call Capacity

- Ensure the network is designed to accommodate for desired capacity
- Can have up to 20 active RTP streams for both 802.11g and 802.11a @ 54mbps with minimal background traffic depending on initial channel utilization
- At 11mbps can have up to 10 active RTP streams with minimal background traffic
PS-POLL

- The 7921G will use PS-POLL when in idle
- If WMM is disabled on the AP, will also use PS-POLL for power save when on call
U-APSD

- When WMM is enabled on the AP, the 7921G will use U-APSD (Unscheduled Auto Power Save Delivery) for power save when on call.
- U-APSD will help optimize battery life.
Cisco Compatible Extensions (CCX)
Accelerating Technology Innovation

- **Version 5**: Management and Wireless IPS
  - Management Frame Protection, Client & Roaming Reporting & Diagnostics, Business Class Wireless Phase II

- **Version 4**: Voice over WLAN
  - Call admission control, UPSD, Voice metrics, MBSSIDs, Link tests, NAC

- **Version 3**: Performance & Security
  - WMM, Proxy ARP, EAP-FAST, & WPA2, Single Sign-On

- **Version 2**: Scaling
  - AP assisted roam, CCKM, Radio measurements, Transmit power control

- **Version 1**: Secure Connectivity
  - LEAP, 802.1x & VLANs per AP TKIP, WIFI

Timeline:
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
Cisco 7921G Wireless Phone

- Wi-Fi VoIP Phone
- Support 802.11a/b/g
- Longest Battery Life
  - Standard battery
    - Talk time: 11.5 hrs
    - Standby time: 150 hrs
  - Extended battery
    - Talk time: 15.5 hrs
    - Standby time: 200 hrs
  Increase is only if the AP supports proxy ARP advertised via CCX IE
- Support Various Security Technology and QoS
7921G Release 1.1

- **G.722/Wideband and iLBC**
  
  G722: Improves audio clarity. Utilizes 80 kbps of bandwidth
  
  iLBC: Enables graceful speech quality degradation in case of packet loss. Utilizes 24 kbps of bandwidth

- EAP-TLS with CCKM
- PEAP (MS-CHAP v2) with CCKM
- Traffic Stream Metrics (CCXv4)
- Traffic Classification (TCLAS)
- Wavelink Avalanche Client
- Site Survey Enhancements
- Local Phone Book and Speed Dials
Nokia Intellisync Client

- Full access to enterprise call control features when on 802.11 network
- Certified with Cisco Unified Communications Manager
- SCCP client; available through Solutions Plus
- New features in version 1.1
  - Support for the new Nokia E51
  - License enforcement
  - Calling Name Display
  - Wireless LAN to GSM handoff
  - On-line services
  - UI Enhancements

Nokia E61
Nokia E61i
Nokia E51
Nokia E65
Dual Mode Options for Different Mobile Workspaces

- Separate devices, numbers and voice mail
- No PBX functionality on mobiles
- Enterprise has no control on mobiles - Cost/Security

No separation of business vs. private use of mobiles

Operator infrastructure

Warehouse/Distribution Center
- Cisco WLAN AP
- Dual Mode device
- Intermec
  - Intermec CN3
  - IP Blue VTGO client
  - Voice and data over the Cisco Unified Wireless Network

Campus/Branch
- Cisco Unified Mobility
- Cisco Unified Communications Manager
- Cisco Aironet AP
- Cisco IP phone

Fixed network

Mobile network

Operator

- Nokia ESeries Devices
- Nokia Intellisync client
- Voice and data over the Cisco Unified Wireless Network

- RIM Blackberry 8820
- Data applications over the Cisco Unified Wireless Network

Operator

- HP iPAQ 600
- IP Blue VTGO client
- Voice and data over the Cisco Unified Wireless Network
The Cisco Unified Wireless Network VoWLAN Design Guide

- Can be found at: