Voice over Wireless LAN - Design
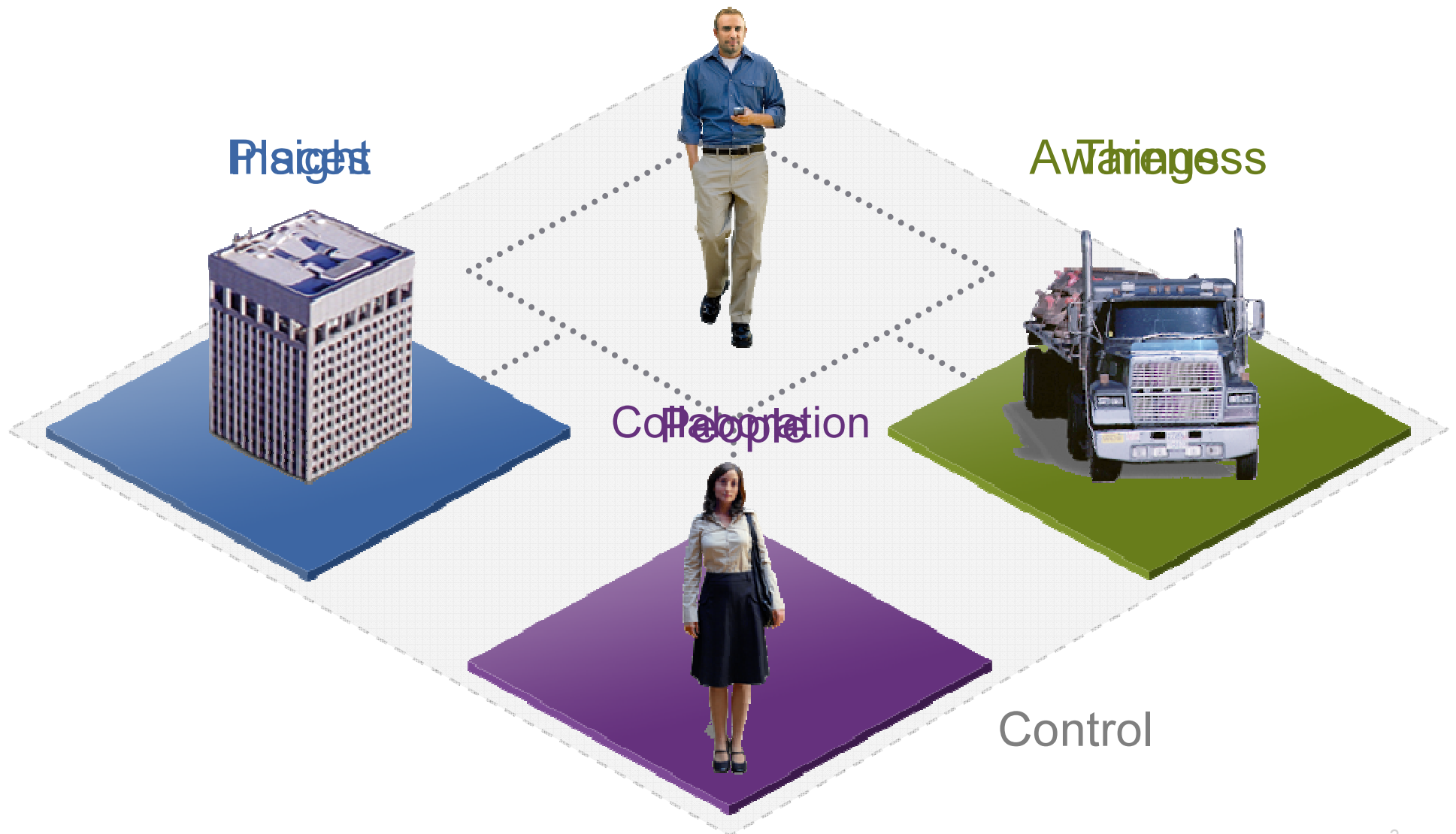
Luka Markota

Systems Engineer

lmarkota@cisco.com

Skopje, 26.11.2008

Agenda

More Specifically, Mobility Is about Connecting People with Other People, Places and Things

Places / Reach

Awareness / Things

Collaboration / People

Control

Business Drivers to Enable Seamless Mobile Collaboration

- **Top Line Benefits:**

  Increased employee productivity

  Increased customer responsiveness

  Improved reachability for faster decision making

- **Bottom Line Benefits:**

  Improved control through least cost routing

  Improved accuracy and reduction of adds/moves/changes expenses

Productivity	
	Rising Expectations
Cost Control	
	Efficiency
Globalization	

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.

Collaboration

Unified Communications over WLAN is a subset of Fixed Mobile Convergence
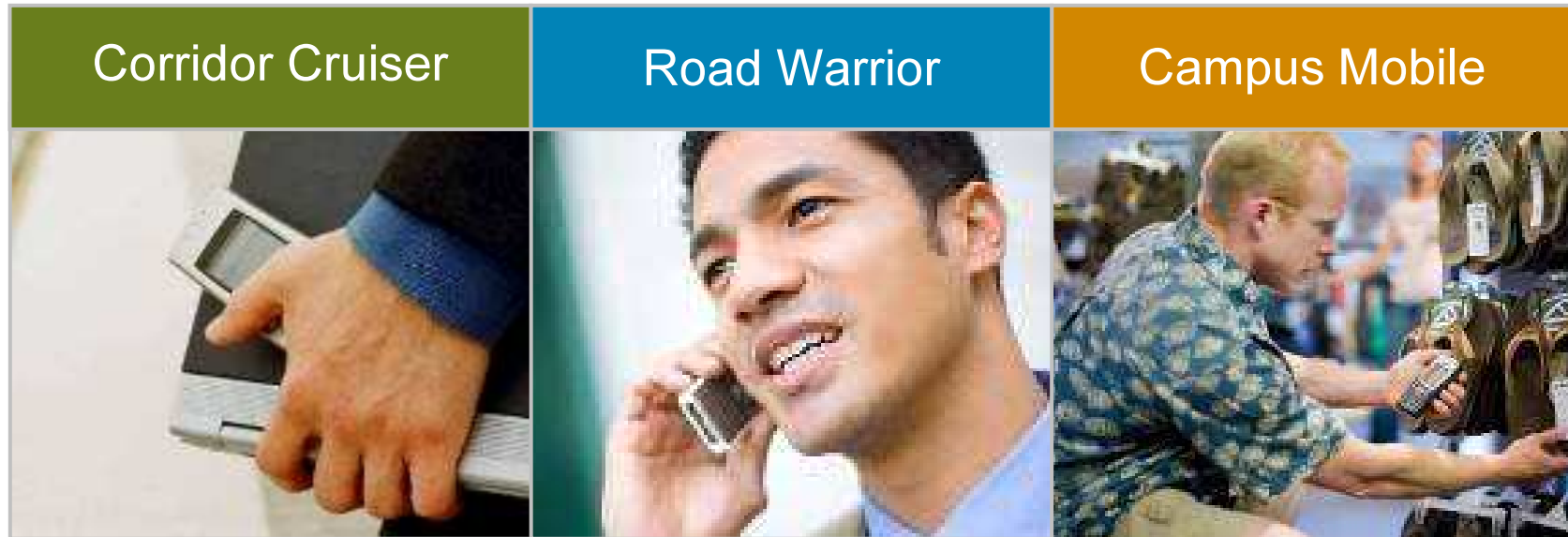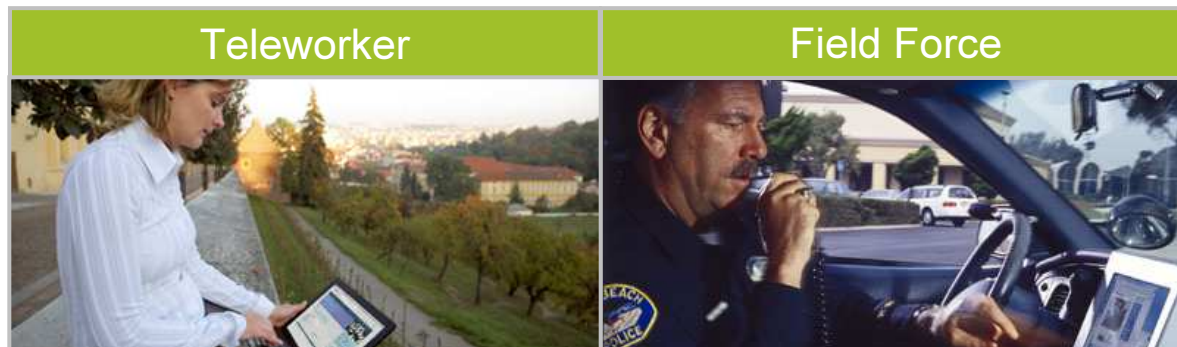
Location

Directory

Presence

Single Number

Single VoiceMail

Ethernet	WLAN	Cellular	WiMAX

Agenda

UC over WLAN as Part of the Mobile Workspaces

Corridor Cruiser	Road Warrior	Campus Mobile

Wherever you are
Whatever you're using

Teleworker	Field Force

UC over WLAN Solution for Road Warrior

Road Warrior

Definition
- Mobile outside the office >80%
- Corporate office available
- Mainly email and phone

Benefits	Cisco Solutions
Improved call success rate and responsiveness	**Mobile Phone extension via SCCP or SIP client with Cisco Unified Communications Manager**
Increased productivity and communications efficiency with visual voicemail, presence, integrated call logs	**SCCP or SIP client with Cisco Unified Communications Manager**
Least cost routing and reduced fixed to mobile costs	**Dual mode phones**
Increased in-building reachability through UC over WLAN	**Cisco Unified Wireless Network**

UC over WLAN Solution for Corridor Cruiser

Corridor Cruiser

Definition
- Mobile within the office more than 20% of the time
- Travel infrequently, often to campus
- Phone, business applications and medium email
- Multiple devices
- Travel outside of campus 30%

Benefits	Cisco Solutions
Improved call success rates and responsiveness through single number reach and single voicemail	**Mobile Phone extension via SCCP or SIP client with Cisco Unified Communications Manager**
Increased productivity and communications efficiency with visual voicemail, presence, integrated call logs	**SSCP or SIP client with Cisco Unified Communications Manager**
A rich collaboration experience when working from a laptop while on-the-go	**Cisco Unified Personal Communicator**
Increased in-building reachability through VoWLAN	**Cisco Unified Wireless Network**
Least cost routing and reduced fixed to mobile costs	**Cisco Unified Wireless IP Phones and/or dual mode phones**

UC over WLAN Solution for Campus Mobile

Campus Mobiles

Definition
- Mobile within the campus more than 70% of the time
- Shared phone no desk
- Heavy phone or pager user, business applications
- Specialized devices (ruggedized, reader…)

Benefits	Cisco Solutions
Increase job/task preformed and improve quality of work by minimizing multiple information touches or delayed data input	**Mobile Phone extension via SCCP or SIP client with Cisco Unified Communications Manager**
Increased in-building reachability through VoWLAN	**Cisco Unified Wireless Network**
Improved collaboration with support for partner Push to Talk applications	**Cisco Unified Communications Manager and Cisco Unified Wireless IP Phones**
Least cost routing and reduced fixed to mobile costs	**Cisco Unified Wireless IP Phones**

Agenda

Main Components of UC over WLAN

Devices

Open and Modular

Applications

Network

Main Components of UC over WLAN

Network
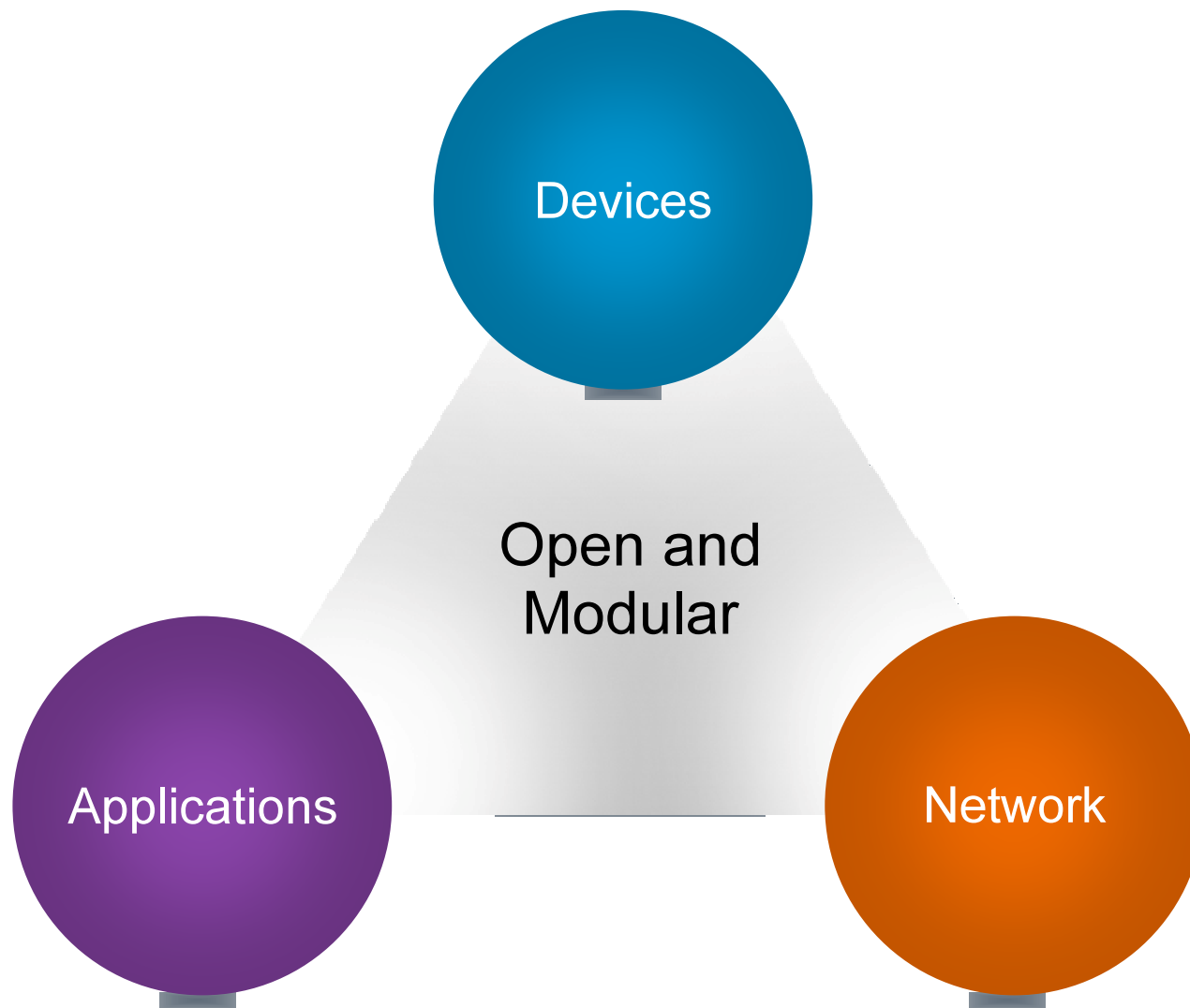
- Cisco Unified Communications Manager Express
- Cisco Unified Communications Manager
- Cisco Unified Communications 500 Series
- Communications Manager Bus Edition

Functions

Manage multi-media communications processing between end-points, UC applications and VoIP gateways.

Voice Gateway

Functions

IOS gateways supporting a variety of signaling and call control protocols for cross-network communications

Messaging Gateway

UMG

Functions

Open, secure, centralized & scalable platform to intelligently route voice messages within UC network

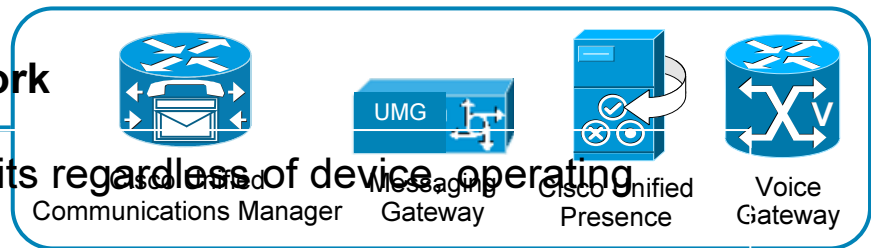**Cisco Unified Presence**

Functions

Manage availability status, preferences, presence application development & integration
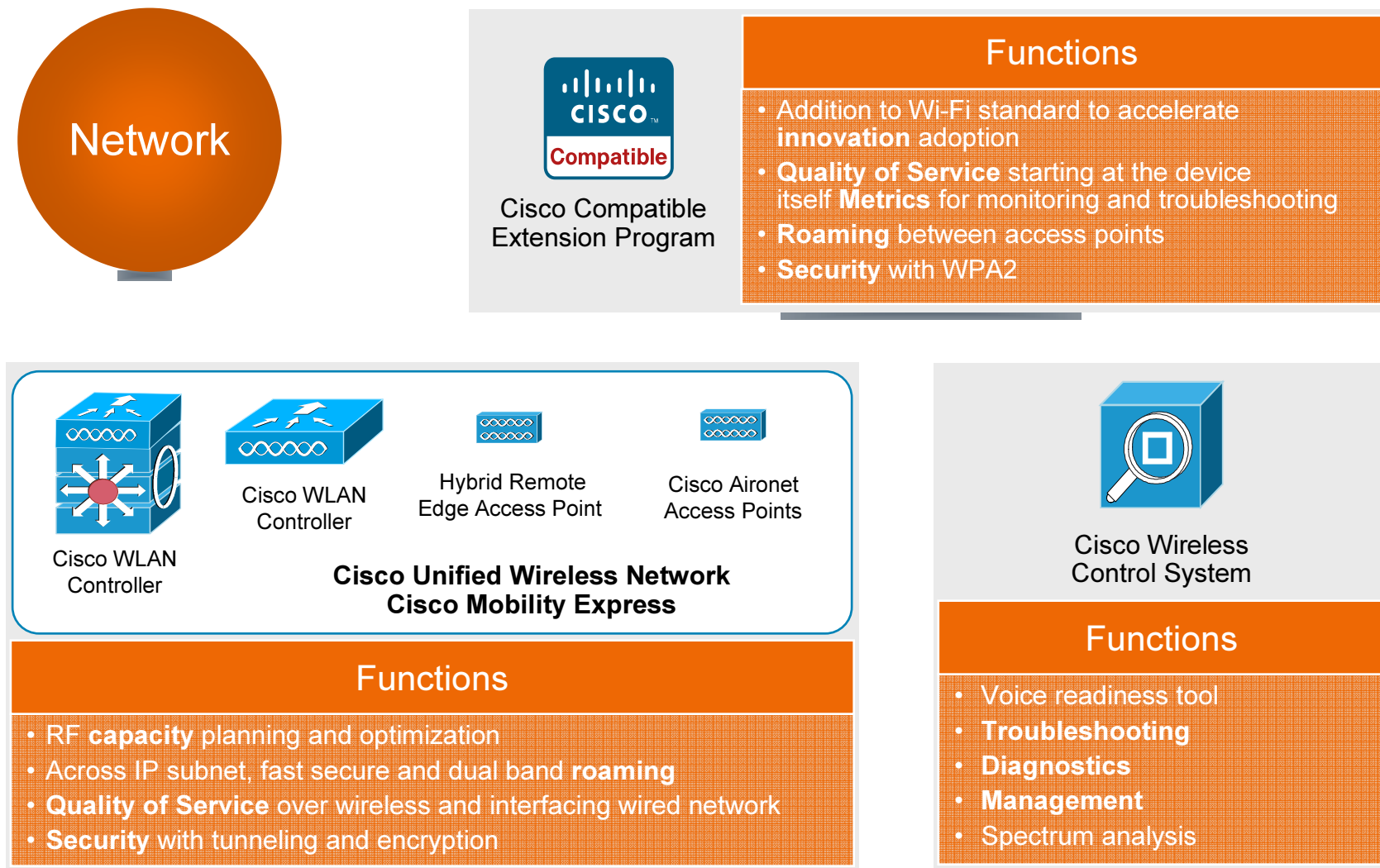
Main Components of UC over WLAN - voice

Considerations when choosing UC network

- Ensure reachability and productivity benefits regardless of device, operating system, network, and application

- Prefer integrated services between fixed and mobile applications to deliver a rich collaboration experience

- Leverage embedded network services to meet compliance, scalability, security, reliability, and management requirements of the business

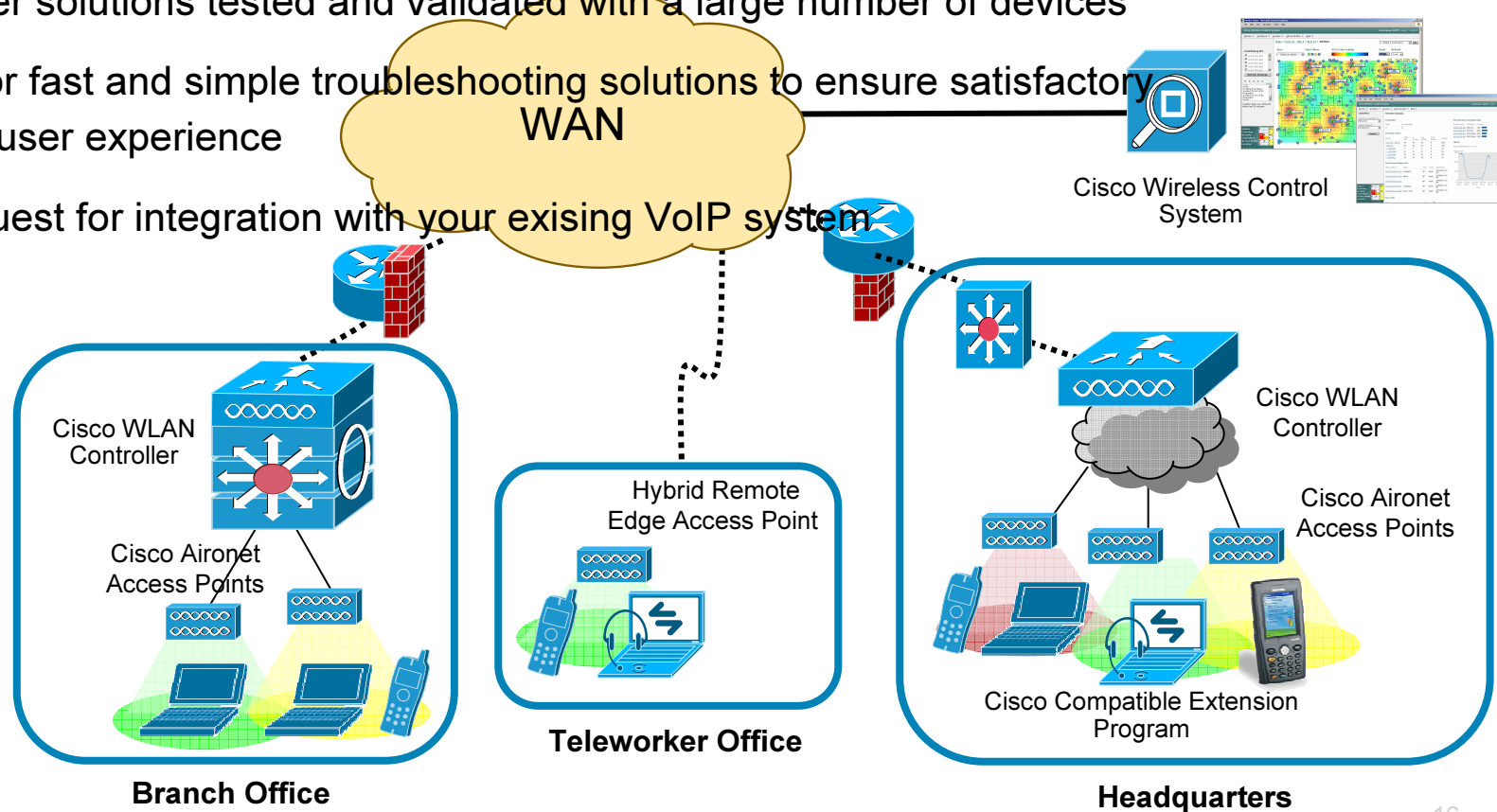- Check for integration with wireless network and devices for QoS needs

Cisco Unified
Communications Manager

UMG

Unified Messaging
Gateway

Cisco Unified
Presence

Voice
Gateway

WAN

Main Components of UC over WLAN - wireless

Network

Cisco Compatible Extension Program

CISCO Compatible

Functions

- Addition to Wi-Fi standard to accelerate **innovation** adoption
- **Quality of Service** starting at the device itself **Metrics** for monitoring and troubleshooting
- **Roaming** between access points
- **Security** with WPA2

Cisco Unified Wireless Network
Cisco Mobility Express

Cisco WLAN Controller

Cisco WLAN Controller

Hybrid Remote Edge Access Point

Cisco Aironet Access Points

Functions

- RF **capacity** planning and optimization
- Across IP subnet, fast secure and dual band **roaming**
- **Quality of Service** over wireless and interfacing wired network
- **Security** with tunneling and encryption

Cisco Wireless Control System

Functions

- Voice readiness tool
- **Troubleshooting**
- **Diagnostics**
- **Management**
- Spectrum analysis

Main Components of UC over WLAN

Design considerations when choosing wireless network

- Check for support Quality of Service end-to-end i.e. supported on all the IT equipment on the path of the voice traffic

- Prefer solutions tested and validated with a large number of devices

- Favor fast and simple troubleshooting solutions to ensure satisfactory end-user experience

- Request for integration with your exising VoIP system

WAN

Cisco Wireless Control System

Cisco WLAN Controller

Cisco Aironet Access Points

Branch Office

Hybrid Remote Edge Access Point

Teleworker Office

Cisco WLAN Controller

Cisco Aironet Access Points

Cisco Compatible Extension Program

Headquarters

Main Components of UC over WLAN Network Design Recommendations

VLANs	Voice should be on a separate VLAN from data
QoS	Need end-to-end QoS (clients, APs, Switches, Routers)
AP Coverage	VoWLAN phones, which are used while the user is in motion, can expose coverage "holes"
Interference	Voice apps won't perform well if there is a lot of interference from Wi-Fi or non Wi-Fi devices, so a good spectrum analysis is important
Capacity	To handle voice and data traffic, more APs are needed, and uniform transmit power is preferable
802.11 a/b/g/n	802.11 a/b/g/n APs provide more speed, more bandwidth, more channels, more reliability and more predictability to handle demands of voice & data applications
Cisco Compatible	Use Cisco Compatible certified devices for Fast handoff, Battery Savings and other benefits not covered by the Wi-Fi standard

White papers
Design Principles for a Voice-Ready Wireless Network
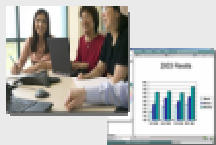Is your WLAN ready for Voice?

Main Components of UC over WLAN

Applications

IP Communicator

Functions
- IP Phone like calling and video capabilities using soft-client on laptops

Unified MeetingPlace Conferencing

Functions
- On-demand rich conferencing and collaboration with MeetingPlace and MeetingPlace Express

Cisco Unity Messaging

Functions
- Ubiquitous on-campus access to Unity Express, Unity Connection, and Unity messaging applications

Unified Personal Communicator

Functions
- Rich UC client that delivers integrated call control, presence, messaging, directory, and conferencing on PC or Mac based laptops

Intellisync Call Connect for Cisco

Functions
- Makes dual-mode phone serve as mobile extension of Cisco IP Phone on-campus

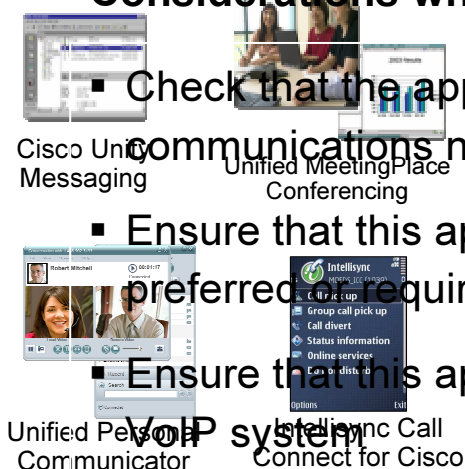# Main Components of UC over WLAN

Considerations when choosing applications

- Check that the application best suited to meet the mobility and unified communications needs of different mobile worker types is supported

- Ensure that this application is optimized to deliver desired UC services to preferred or required mobile devices

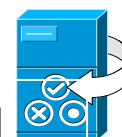- Ensure that this application is optimized over the wireless network and VoIP system
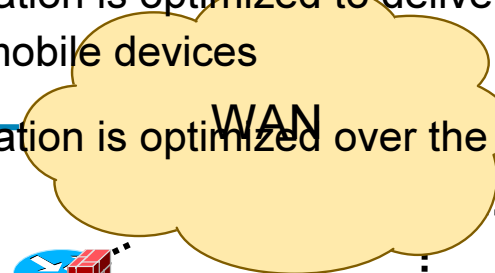
Cisco Unified Messaging

Unified MeetingPlace Conferencing

Unified Personal Communicator

Intellisync Call Connect for Cisco

UMG

Cisco Unified Communications Manager

Messaging Gateway

Cisco Unified Presence

Voice Gateway

WAN

Cisco Wireless Control System

Cisco WLAN Controller

Cisco Aironet Access Points

Hybrid Remote Edge Access Point

Teleworker Office

Cisco WLAN Controller

Cisco Aironet Access Points

Cisco Compatible Extension Program

Headquarters

Branch Office

Main Components of UC over WLAN

Devices

Wi-Fi Laptops

Functions

- On-demand used for **business applications**
- Can be enhanced with **soft phones**
- **Widely available** with 802.11 a/b/g and now 802.11n
- **Large** screen and form factor
- Nomadic use

Dual Mode Phones

Functions

- For **Cellular and WLAN** coverage
- **Ruggedized** version available for field workers
- **Small** screen and form factor
- Mainly used for **emails** and phone **calls**

Wi-Fi Phones

Functions

- For **Ruggedized** version available for field workers
- For **on campus** use (WLAN only)
- **Small** screen and form factor
- Mainly used for phone **calls**
- Possibility to add simple applications on the device

Main Components of UC over WLAN

Considerations when choosing devices

- Determine Mobile Workspaces are present in the company and which applications should be made available on the go to whom
- Think about your device management strategy
- Check that enhanced with QoS, power savings and roaming features are present

Cisco Unity Messaging

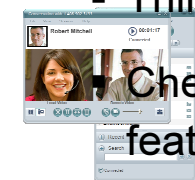Unified MeetingPlace Conferencing
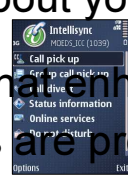
Cisco Unified Communications Manager
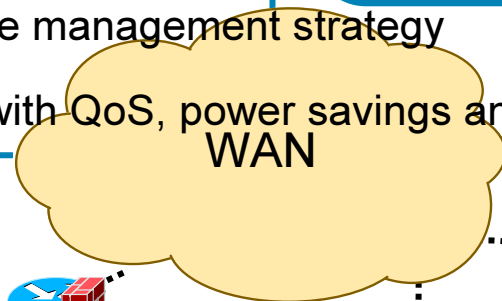
Messaging Gateway

Cisco Unified Presence

Voice Gateway

Unified Personal Communicator

Intellisync Call Connect for Cisco

WAN

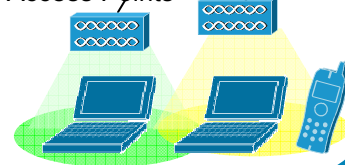Cisco Wireless Control System

Branch Office

Cisco WLAN Controller

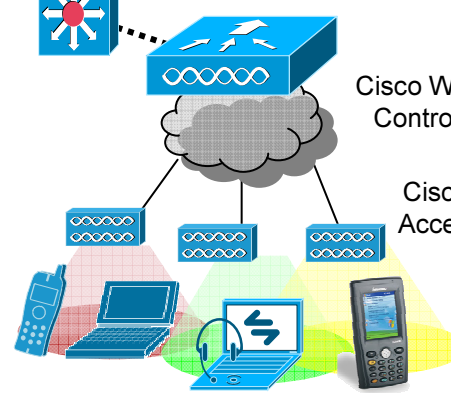Cisco Aironet Access Points

Hybrid Remote Edge Access Point

Teleworker Office

Cisco WLAN Controller

Cisco Aironet Access Points

Cisco Compatible Extension Program

Headquarters

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Agenda

Portfolio to Unify the Mobile Workspace

- Cisco Unity Messaging

- Cisco United MeetingPlace

- Cisco Unified Personal Communicator

- Cisco Unified IP Communicator

- Cisco Unified Wireless IP Phone 7921G, 7925G

- Cisco Unified Wireless Network

- Cisco Mobility Express Solution

- Cisco Certified Dual-Mode Devices

- Nokia Intellisync Call Connect for Cisco

- Cisco Unified Communications Manager

- Cisco Unified Video Advantage

Cisco Unified Wireless IP Phone 7921G

- Wireless IP Phone increases productivity by increasing reach-ability

- Reduce costs by utilizing a single converged network

- Easy-to-use wireless IP phone (802.11a/b/g)

- 2" Color display and intuitive access to features

- Dedicated key that can support PTT XML applications

- Improved battery life (1.04)

  - Talk time: from 12 hrs to 15.5 hrs

  - Standby time: from 80 hrs - 150 hrs

- Multi-Charger

Cisco Unified Wireless IP Phone 7925G

- **Ruggedized**
  - Dust protected
  - Splashing protected
- **Bluetooth 2.0**
  - Bluetooth/WLAN Coexistence
- Battery Life
  - Standard Battery (1100 mAh) -Up to 180 hours standby OR up to 9.5 hours talk time
  - Extended Battery (1400 mAh) - Up to 240 hours standby OR up to 13 hours talk time
- Improved Durability
  - 5 ft (1.5 m) drop to concrete w/o carry case
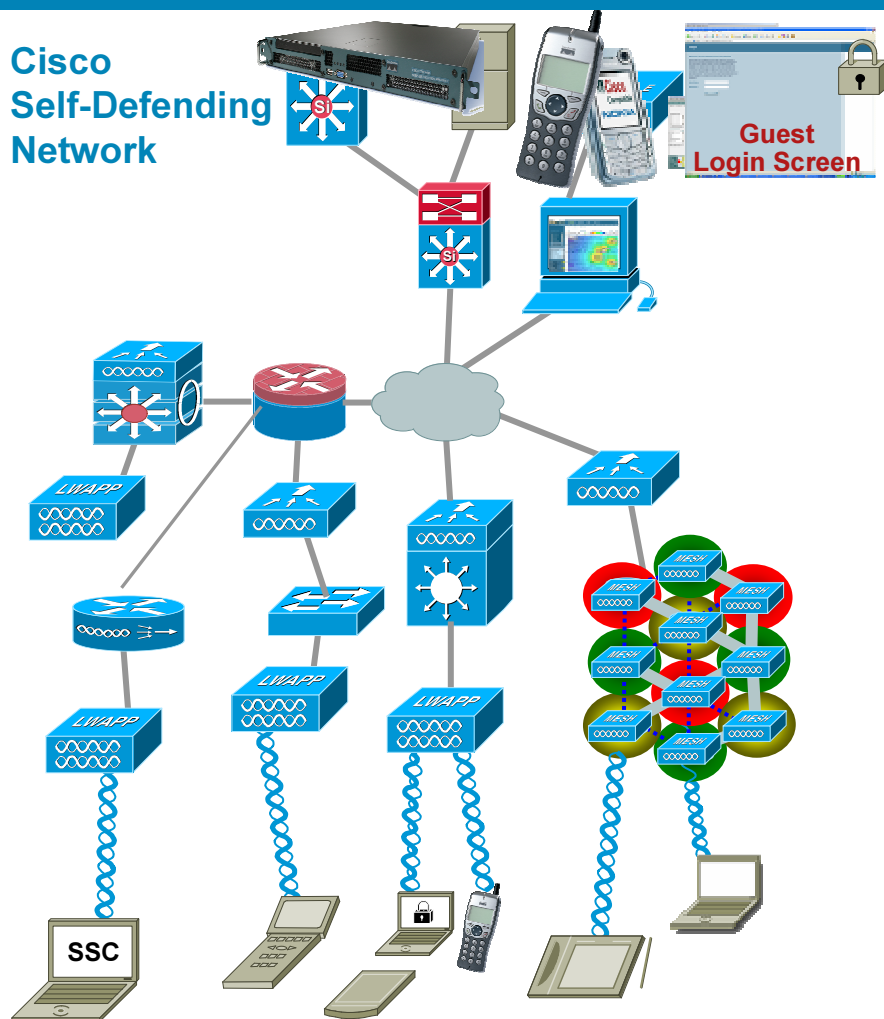- Latex Free
- RoHS Compliant (Lead Free)

Cisco Unified Wireless Network

Cisco Self-Defending Network

Guest Login Screen

Wireless LAN Mobility Services

Unified cellular and Wi-Fi VoIP. Advanced threat detection, identity networking, location-based security, asset tracking and guest access.

World-Class Network Management

Same level of security, scalability, reliability, ease of deployment, and management for wireless LANs as wired LANs.

Network Unification

Integration into all major switching and routing platforms. Secure innovative WLAN controllers.

Access Points

Ubiquitous network access in all environments. Enhanced productivity. Proven platform with large install base and leading market share. Plug and Play.

Client Devices

95% of Wi-Fi silicon is Cisco Compatible Certified. Cisco SSC delivers uniform security and services for wired and wireless connections.

Cisco Mobility Express Solution

An SMB Solution That Evolves with You

Integration	Flexible Cost	Business-grade features

▪ Part of the Smart Business Communications System	▪ Pay as you grow
	    Hardware
	    Software
	    Advanced mobility services
		▪ Reliability built-in
		▪ Security
		▪ Scalability
		▪ Advanced mobility services

Cisco Mobility Express Solution

Application-Based
Access points, controllers, plus application servers

Controller-Based
Access points plus controllers

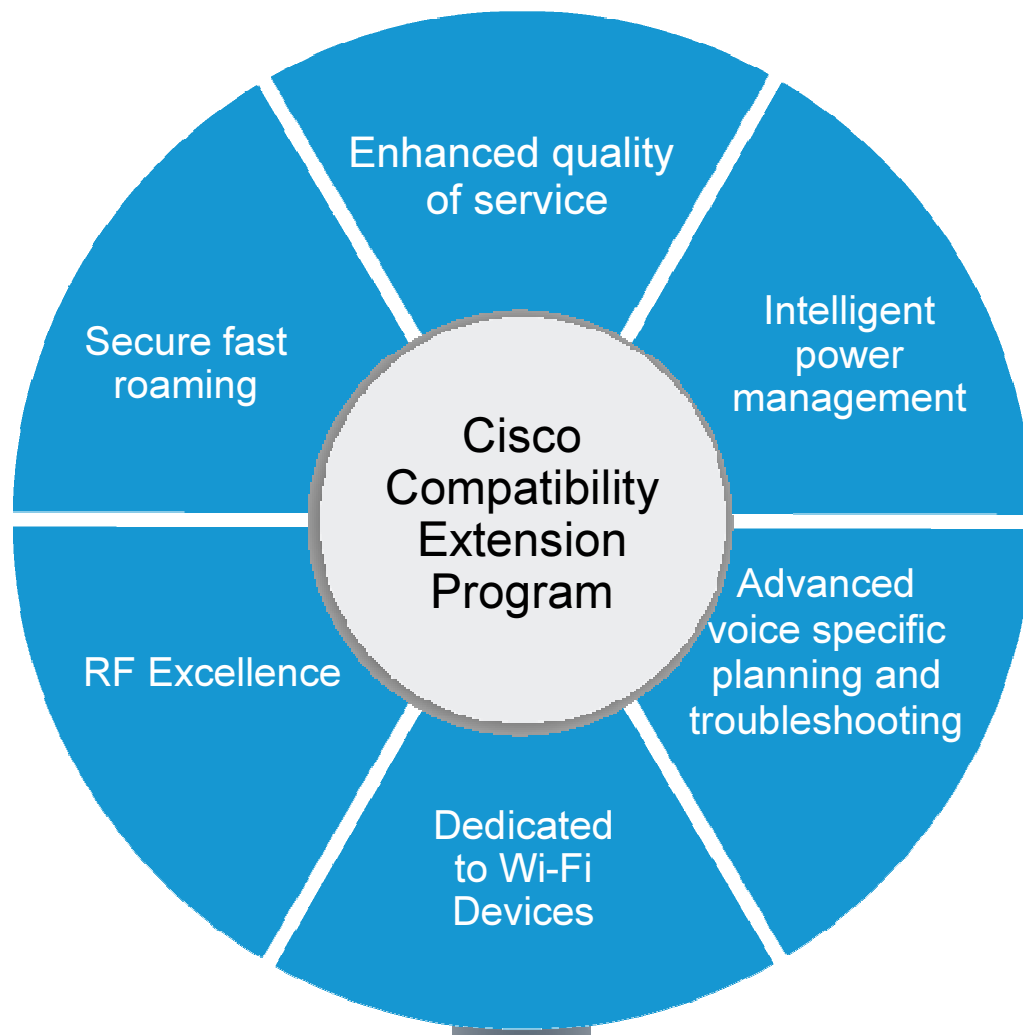**Standalone**
Access points

Adapt to Your Level
of Sophistication

Grow with
Your Business

Offer a Mobile
Foundation for All

Cisco Compatible Extension Program

Cisco Compatibility Delivers Better Performance over a Cisco Unified Wireless Network

Cisco Compatibility Extension Program

- Enhanced quality of service
- Intelligent power management
- Advanced voice specific planning and troubleshooting
- Dedicated to Wi-Fi Devices
- RF Excellence
- Secure fast roaming

Cisco Certified Dual Mode Devices

RIM
Blackberry 8820

- Dual mode device delivers always on in-building reachability for e-mail and applications
- 802.11a/b/g, GPS, GSM/EDGE
- Enterprise-class security with WPA2
- Cisco CCXv3 Certification with Cisco Unified Wireless Network

Intermec
CN3 Ruggedized PDA

- Ruggedized dual mode computer with voice and data over the WLAN in-building
- Integrated 802.11b/g, GPS, GSM/EDGE or CDMA
- Enterprise-class security with WPA2
- Cisco CCXv4 Certification with Cisco Unified Wireless Network
- Voice over WLAN certified with Cisco Unified Communications Manager

HP
iPaq 600

- Dual mode 3G phone with voice and data over the WLAN in-building
- 802.11b/g, GSM/EDGE, GPS
- Enterprise-class security with WPA2
- Cisco CCXv4 Certification with Cisco Unified Wireless Network
- Voice over WLAN certified with Cisco Unified Communications Manager

Dual Mode Devices with SCCP or SIP Clients

Vendor	Model	Cisco Unified Wireless Network Certified	Unified Communications Certified
Nokia (solution Plus partner)	E65	√	√
	E61i	√	√
	E61	√	√
Intermec	CN3	√	√*
HP	iPaq 600		√
RIM	8820		√**

* Cisco Unified Communication Manager version 4.0
** Cisco Unified Communication Manager Express

Nokia Intellisync Call Connector for Cisco
Client v1.1

- 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

   Added support for the new Nokia E51

   License enforcement

   Manual wireless LAN to GSM handoff

   CUCM 6.x support
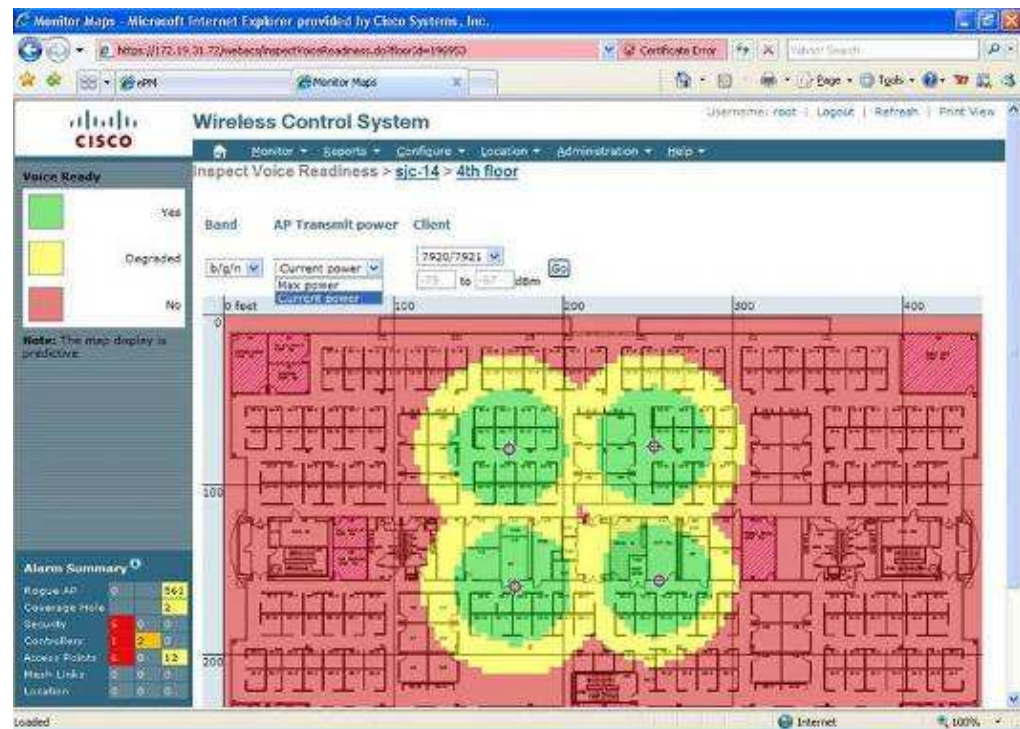

Nokia E61i

Nokia E61

Nokia E51

Nokia E65

Agenda

VoWLAN Network Readiness Tool

- Post deployment tool that helps validate that the radio coverage requirements are met for VoWLAN

- The tool can use the information calibration when available to provide better accuracy.

- Inputs can be any signal strength required by a Wi-Fi voice device (including non Cisco devices)


Benefits	• Fast and simple way to instantly check network readiness for VoWLAN • High end users satisfaction as wireless network degradations are rapidly identified and addressed

Cisco Fast Secure Roaming

- Compatible with WPA2 and supported for Cisco Compatible Extensions clients and Cisco 7921 Wireless IP Phone

- Enhanced Neighborhood List to exchange information with AP nearby (RF parameters, authentication, measurement) and fasten roaming

Wireless Control System

WLAN Controller

Roam Time Reports

WLAN Access Point
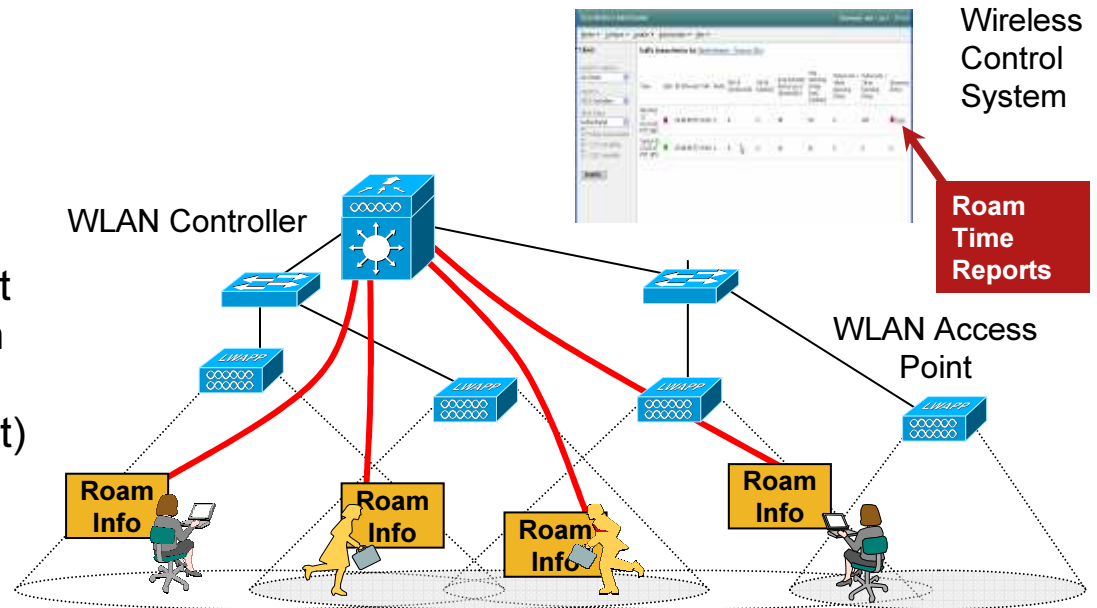
Roam Info

Benefits	• Increased security including Voice traffic • Transparent roaming for end-user • Optimized capacity utilization at the network level	CISCO™ Compatible

Spectrum Analysis

Other Devices:
2.4/5 GHz Products that Interfere

SpectrumRF Interference Kills Voice Over Wi-Fi Reliability

- Reduces voice quality

    Transmit delays & collisions

    Results in Jitter

- Reduces voice capacity

    Interference air-time causes Reduced channel capacity

- Reduces voice coverage

    Interference reduces SNR Results in Cold spots

Spectrum Intelligence is the Solution

- Pro-actively monitor for RF interference

    Before reported by users

- Identify and eliminate interference sources

    Enforce spectrum policy

- Mitigate impact of devices that must stay

    Network tuning & Shielding

Access Points Optimized for Voice

- Call Control Admission at the access point level

    Ensures QoS is maintained when network congestion occurs

    Prioritizes calls in progress over new requests for calls

    Triggers dynamic load balancing across multiple AP's to ensure high availability

- Minimum retries and fast rate-shifting algorithm

    For a faster delivery of short voice packets

- Intelligent packet-discard algorithms

    To reduce retransmission and delay

Retries

Data

Voice

Time/ Delay
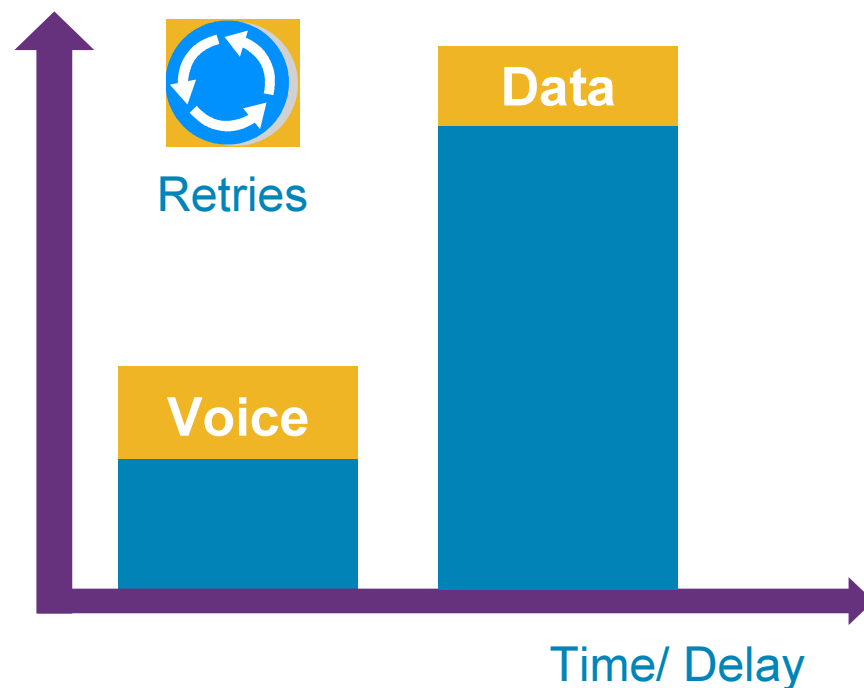
Benefits	• Increased number of calls per AP
	• Improved network availability and audio quality during peak utilization
	• Enhanced end-user experience in a consistent manner

Power Save for Longer Battery Life
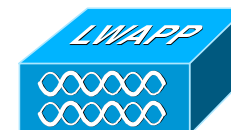
Legacy Power Save

WMM Power Save

Wireless CCX V4 Voice Client

Sleep

Voice

- Allows send/receive in one operation to minimize battery drain

- Available in CCX Version 4 Clients

Cisco Unified Voice Ready Wireless Network

Benefits	• Increased number of calls per AP
	• Double talk time to be on par with cellular
	• Reduce inventory cost
	• Enhanced end-user satisfaction and fasten adoption

Summary - Cisco Validated Design Guide
Top 10 recommendations

1. QoS and Availability on your wired network is your foundation

2. Security requirements for voice applications are different than from data

3. Start with user consultation and education

4. Address VoWLAN availability requirements in planning and design

5. Maximize your WLAN Capacity by using the 5GHz spectrum

6. Choose the right VoWLAN handset based on user requirement and features includes in Cisco Compatible Extension Program

7. Follow the VoWLAN handset guidance in planning and design

8. Use Radio Resource Management for deployment, monitoring, and troubleshooting your WLAN

9. Perform a post installation site-survey to confirm you have met your VoWLAN goals

10. Plan for the future and the addition of more services such as Location

Cisco VoWLAN 1.0 Validated Design Guide

ISG8

ISG8   To be hyperlinked when available
               Isabelle Guis, 12/19/2007