TOMORROW starts here.
Deploying Service Provider Wi-Fi

BRKSPM-2001

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Solution Architect
Service Provider Wi-Fi is all About Optimising & Monetising the Network

Agenda

- **WHY** SP Wi-Fi: Drivers/Motivators
  - Overview on SP Wi-Fi

- **WHAT** Defines SP Wi-Fi
  - Requirements, Architectures, Components

- **HOW** SP Wi-Fi is being deployed
  - Use Cases, Call Flows & Case Studies
Why are SPs Deploying Wi-Fi ??
Market Dynamics Driving the Need for SP Wi-Fi

Growth in Mobile Data

Lack of Spectrum

Attractive Economics

Wi-Fi Ubiquitous in Devices

Big Shift to Indoor Consumption

High interest from Service Providers in adding Wi-Fi access
Wi-Fi Incorporates a Number of Key Benefits for Service Providers’ Business

- **Retention & Loyalty**: Increase customer stickiness by offering free mobile Internet through public Wi-Fi.
- **New revenues**: Generate new revenue streams via innovative wireless services.
- **Mobile offload**: Optimise mobile data network or offer offload services to mobile operators.
- **ARPU Increase**: Move customers up the value chain by upgrading them to premium packages.

**Business Services**: Offer managed wireless LAN services to small businesses, retail & enterprises.
Customer Perception of Wi-Fi Offering:
Why it is important to Service Providers?

Importance of Free Wi-Fi in Broadband Provider Choice
( answering ‘yes’ to a bundled subscription)

80% of consumers believe free public Wi-Fi is a very important criteria when choosing a provider

Changing Broadband Provider for Free Public Wi-Fi

Almost 70% (!) of consumers are likely to change a provider in order to have free public Wi-Fi

Most Important Wi-Fi Network Features

- Speed of Network
- Low Cost to Use
- Unlimited Data Usage
- High Level of Security
- Network Coverage
- Automated Login
- Simple Manual Login
- National and International Roaming
- Active Choice to Select Network
- None of the Above
- Access to Unique Content

Majority of consumers consider User Experience metrics like Speed and Auto-login to be paramount

Source: ‘Understanding What Customers Want from Wi-Fi’ a Cisco IBSG Customer Research (Insights from Latin America Study Results), May 2012
Retrieval & Loyalty: Helping Operators Fight Customer Flight Churn

Churn Reduction as a result of free public Wi-Fi

- Actual results are as high as 50% (!) churn reduction in the first years
- Reduction is estimated to remain significant, yet decrease along the years, considering that more operators will offer public Wi-Fi

Source: Years 1 & 2 based on actual experience of cable operators (Cisco customers) in the US & Canada
ARPU Increase: Drives Existing Customers Up the Value Chain

1. Associate Wi-Fi rights with premium dual or bundled packages

   Who implements it?

   - Shaw
   - Cablevision
   - Cox
   - Bright House
   - Comcast
   - Time Warner Cable
   - NET

2. Offer better experience as customers go up the value chain

   A. Better speeds while on public Wi-Fi

   B. More devices registered for automatic login

Who implements it?

- Shaw Exo WiFi Trial
- Maximum Speed Available
- 1 mobile devices to the Shaw Exo WiFi Trial
- 6 mobile devices to the Shaw Exo WiFi Trial
- 10 mobile devices to the Shaw Exo WiFi Trial

TV only

Dual-Play

Triple-Play

Select your Shaw internet package:

- High Speed Lite
  - Shaw Exo Internet speed: 1

- High Speed 20
  - Shaw Exo Internet speed: 20

- Broadband 50
  - Shaw Exo Internet speed: 50

Shaw Exo WiFi Trial download speed:

- 1Mbps

- 20Mbps

- Maximum Speed Available

You can register to automatically connect

- 1 mobile devices to the Shaw Exo WiFi Trial

- 6 mobile devices to the Shaw Exo WiFi Trial

- 10 mobile devices to the Shaw Exo WiFi Trial
Mobile Data Offload:
NET Brazil Outdoor Wi-Fi Used for Claro

NET Serviços, Brazil largest cable operator, offers today the largest deployment of outdoor Wi-Fi with thousands of access points already available.

A Cisco outdoor AP 1552C with CleanAir technology installed.

A single access point is offering 3 SSIDs, one per service.

CLARO SSID is a closed (secured) network; Claro users connect and authenticate automatically.

NET broadband clients are eligible for NET free public Wi-Fi through this SSID.
Business Services:  
Managed Wi-Fi offerings to Hospitality & Enterprise

Venues and retail owners start using Wi-Fi as a way to improve their business:

- Generates more consumer traffic - attracting more customers
- Increases customer dwell time (more time spent = more money)

Example:

AT&T partnering with largest US restaurant and coffee chains to provide free Wi-Fi

💡 Normally creates an opportunity for the service provider to provide not only guest access to the public, but also business services to venue / retail owner
Location-based Services

Connected Mobile Experience: Detect, Connect & Engage
Location Data Analytics:
Measuring Customer Movement Using Wi-Fi

Analyse how customers move, where they crowd, how they spend time

Benefits for malls / venues:
- Detailed understanding of customer footprint
- Quantify & justify rental renewal negotiations
- Measure impact of advertisement & signage
- Analyse impact of changes applied to mall
- No applications, hardware or sensors required!
Why Service Provider Wi-Fi?
3 Key Reasons

1. **Optimisation** – increases network capacity and reduce 3G/4G data traffic overload by offloading traffic with SP Wi-Fi.

2. **Monetisation** – creates new revenue streams by taking advantage of advanced technology that provides secure delivery of location-based services to mobile devices, new services & increased ARPU.

3. **Customer-base Retention & Addition** – expand a physical footprint with a cost-effective Wi-Fi solution to keep customers on the service provider network as they move about and attract new customers.
What are the SP Wi-Fi Requirements?
SP Wi-Fi Vision: End User Perspective
Cellular Mobility Experience on Wi-Fi

Cellular
Example: GSM Phone
Turn on phone and get secure cellular connectivity

• Roaming anywhere – no logins or passwords
• Automatic Network Selection
• Access anywhere with my profile & services

Wi-Fi
Example: iPhone
Turn on phone and get secure Wi-Fi connectivity
## SP Wi-Fi: Carrier-class Attributes

### Key Requirements

<table>
<thead>
<tr>
<th>Category</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier Grade</td>
<td>Manageability, Network Reliability and Availability 100s of thousands of APs; Millions (residential); Millions of Clients</td>
</tr>
<tr>
<td>Mobility</td>
<td>Seamless authentication and Fast Roaming/Handoff Wi-Fi to Wi-Fi (inter and intra-vendor), 3G/4G to Wi-Fi</td>
</tr>
<tr>
<td>Roaming</td>
<td>Seamless roaming (with little or no user intervention) Support home and “visited” network scenarios</td>
</tr>
<tr>
<td>Standards Compliant</td>
<td>Critical to support Multi-vendor solution 3GPP compliance important to MNOs</td>
</tr>
<tr>
<td>Integration</td>
<td>Common Billing, Policy and Subscriber Management Leverage MPC/EPC for Wi-Fi network Parental Control / Lawful Intercept / Local Breakout</td>
</tr>
</tbody>
</table>
### SP Wi-Fi: Common Deployments

**One Access Technology, Many Deployment Models**

<table>
<thead>
<tr>
<th>Deployment Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncontrolled</td>
<td>No SP involvement. User driven offload via unmanaged device.</td>
</tr>
<tr>
<td>Home/Soho Dual SSID (Community)</td>
<td>SP provides dual SSID home device. Private and public (community) SSID</td>
</tr>
<tr>
<td>Hot Spot / Hot Zone</td>
<td>SP installed and managed hot spots in Malls, restaurants, Hotels,…</td>
</tr>
<tr>
<td>High Density Wireless</td>
<td>SP installed and managed hot spots in high density user areas (stadiums,..)</td>
</tr>
<tr>
<td>Metro / Mesh</td>
<td>SP install and manages outdoor Wi-Fi for large dense urban areas coverage</td>
</tr>
<tr>
<td>Enterprise Guest Access</td>
<td>Enterprise Guest Access managed by SP</td>
</tr>
</tbody>
</table>
SP Wi-Fi: Evolving From Silo’d Solutions….
…to a Unified Architecture

MSP

3G/4G Mobile Packet Core

FSP

MSO

Fixed BB Infra

Converged Operator

Cisco Public
SP Wi-Fi: Unified Architecture

AP = Access Point
MAG = Mobility Access Gateway
WLC = Wireless LAN controller
LMA = Local Mobility Anchor
GTP = GPRS Tunnelling Protocol
IPSG = IP Services Gateway
PMIP = Proxy Mobile IP (v6)
UE = User Entity (mobile terminal)
SP Wi-Fi Converged Architecture
Enabling Seamless Convergence

Hotspot

Public/Large Venue

Community WiFi

Wholesale Provider

WAG

Access Network Policy

Portal

DHCP

AAA

Optional NAT

PMIP

GTP

Gn'

Local Breakout (LBO)

Tunneled Access: L2TP, PMIP, EoGRE

WLC

Aggregation Switch

AP

Retailer Providers

Internet Services

MNO Home Network Policy

HLR

OCS

PCRF

CGF

Internet Services

Roaming Partner Core

Internet Services

Roaming Partner Core

Internet Services

Roaming Partner Core

Internet Services

Wholesale Provider

Retailer Providers

Internet Services
Cisco SP Wi-Fi Whole Offer

Products
- Indoor AP
- Outdoor AP
- Residential Gateway
- Cisco Wireless Controller
- Cisco Intelligent Services Gateway
- Cisco CAR, CNR, Policy, & NCS
- Cisco Mobile Packet Core

System
- AP
- Residential Gtwy
- WLC
- ISG
- Cisco Mgmt & Provisioning
- Cisco Mobile Packet Core
- Broadhop

Solution
- Cisco SP Wi-Fi Advanced Services Practice
- Solution Engineering and Customisation
- Customer Business Models & Go-to-Market Packages

Whole Offer
- Cisco & 3rd Party Products
- Cisco SP Wi-Fi Advanced Services Practice
- Solution Engineering and Customisation
- Cisco Capital

Customer Experience
- Fragmented to one stop shop
- Product to solution
- Technology issue to business solution
Cisco SP Wi-Fi Solution
Access + Service and Policy + Packet Core Integration

Subscriber management
RADIUS authentication
Web Portal
Network policy control

Wireless Controllers
CAPWAP

Wireless LAN policy
RF management
Roaming

Home Network AAA
IP Transfer Point
MPC

3G/4G Mobile Packet Core

SUM PCRF Portal AAA
MAP

3G/4G Core SS7
HLR AU

Internet

Customer's Wi-Fi APs

ISG/WAG NAT Firewall

Internet

Session management
Layer 4 redirection
Transparent auto logon

Usage statistics
Policy enforcement

NMS

DHCP

Web Portal
Network policy control

Wireless LAN policy
RF management
Roaming

Portal AAA

PMIPv6

Mercier Public
### Core SP Wi-Fi Functional Components

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<td>DIAMETER</td>
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<td>HLR / HSS</td>
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<tr>
<td>Integration / Roaming</td>
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<tr>
<td>Authentication point</td>
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<td>EAP / Web Auth</td>
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<th>Address Allocation</th>
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<td>At LMA</td>
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<td>External DHCP</td>
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<td>IPv4 / IPv6</td>
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<td>Session Initiation</td>
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<td>Fragmentation</td>
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<td>L2TP (AZR) / GTP</td>
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<td>Parental Control</td>
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<th>Subscriber Management</th>
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<td>Pre-paid / Quotas</td>
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<td>Wi-Fi only users</td>
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<td>Transparent logon</td>
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<td>Service profiles</td>
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<tr>
<td>Self service portals</td>
</tr>
</tbody>
</table>
Authentication Options

Two main authentication models

- **EAP/802.1x – WLC Authentication / ISG - Authorisation**
  - Secure SSID
  - AAA is the authentication server
  - Seamless authorisation but requires client configuration (certificates, username/pwd, etc)
  - EAP-SIM/AKA helps if proper supplicant available on terminal device

- **Weblogin – Portal-based Authentication and Authorisation**
  - Open SSID
  - Requires no client configuration, completely Web-based
  - Subsequent Logons are transparent using device MAC address
  - Vulnerable to MAC Spoofing
Address Allocation & Management
Assignment Considerations

- **When to assign?**
  - Before authentication for Web-auth users
  - Post authentication for EAP / 802.1x

- **Where in the network?**
  - In the access network or in the core

- **Where is the DHCP server?**
  - Local
  - External
  - Relay/Proxy functions

- **What to assign?**
  - Location based address assignment with option 82

- **Subnet size?**
  - Lease time
  - Broadcast domain size
Subscriber Session Initiation & Termination

Deployment considerations

- Session creation (First Sign of Life - FSOL)
  - DHCP initiated (L2 connected)
  - Unclassified MAC (L2 Connected)
  - Unclassified IP (L3 routed)
  - RADIUS proxy/accounting start (L3 Routed)

- Session termination options
  - Idle timeouts? Keep alives? How are you billing?
  - DHCP lease expiry
  - Authentication timeout
Session Management
Service considerations

- Service Differentiation
  - Gold / Silver / Bronze / policy enforcement
  - Parental control / DPI
- Quota enforcement
  - Usage based / Time based
- Location based services
- Free services
  - Open garden
  - Whitelisting
- Dynamic service updates
  - Policy push
- Service Control and Policy
  - DPI
- Targeted Push Advertising
  - Intelligent, Location-aware
- Branding
Mobility Management

Essentials for Mobility

- Common anchor point for all access technologies
- A common subscriber identifier across all access technologies
  - Eg. MAC address, MSISDN…. key for inter-access mobility
- Address allocated from a common DHCP pool
- A common authentication scheme
- Common session identifier
  - For common billing and subscriber service across WiFi/3G/4G
- Ability to track subscriber
- Next Generation Hotspot (Roaming)
SP Wi-Fi Common Deployment Models
SP Wi-Fi: Deployment Architectures & Use Cases

Layer2 connected

Layer3 Routed

Packet Core Integration

Metro-WiFi Deployment

Hotspot Deployment

MPC Integration
## SP Wi-Fi Deployment Use Cases

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<tr>
<th>Market Segments</th>
<th>Use Case Scenarios</th>
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<tr>
<td>Metro-WiFi Deployment (Layer 2 connected)</td>
<td>• Open Authentication</td>
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<td></td>
<td>• Web Authentication (Web-Login)</td>
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<tr>
<td></td>
<td>• Web Authentication (One-Click)</td>
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<td></td>
<td>• WISPr</td>
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<tr>
<td></td>
<td>• Voucher-based Authentication</td>
</tr>
<tr>
<td></td>
<td>• Pre-paid (Time/Quota)</td>
</tr>
<tr>
<td></td>
<td>• EAP-PEAP</td>
</tr>
<tr>
<td></td>
<td>• EAP-SIM</td>
</tr>
<tr>
<td></td>
<td>• Hotspot 2.0</td>
</tr>
<tr>
<td></td>
<td>• Open Transparent Auto Logon (TAL) (MAC-based)</td>
</tr>
<tr>
<td></td>
<td>• TAL (MAC-based with DHCP Lease Query)</td>
</tr>
<tr>
<td>HotSpot Deployment (Layer3 Routed)</td>
<td></td>
</tr>
<tr>
<td>Packet Core Integration Deployment</td>
<td></td>
</tr>
</tbody>
</table>
## Metro Wi-Fi Offload Deployment

### Connectivity
- L2-connected network
- Unclassified MAC/DHCP initiator

### IP Addressing
- IPv4 Clients
- External/Internal DHCP

### Services
- Stadium, Metro Station Public Hotspots
- Open Access Wi-Fi Services
- Web Authentication
- EAP-SIM Authentication
- Dynamic Service Selection
Metro Wi-Fi Offload Deployment

<table>
<thead>
<tr>
<th>Client</th>
<th>Layer 2 network</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphone user</td>
<td>GE (dot1Q)</td>
<td>Web Authentication</td>
</tr>
<tr>
<td>PC/Laptop user</td>
<td>VPLS/EoIP</td>
<td>Open Access users</td>
</tr>
<tr>
<td></td>
<td>CAPWAP</td>
<td>EAP users</td>
</tr>
</tbody>
</table>

AAA/Portal  HLR  OCS  PCRF

DHCP Server

Int or Sub-int
GE (.1Q)

Traffic flow
AAA interactions

MPLS/IP Core

Internet
Hotspot Deployment

Connectivity
- L3-connected network
- Unclassified IP OR RADIUS Proxy initiator

IP Addressing
- IPv4 Clients
- External DHCP

Services
- Mobile Data Offload
- Open Access Wi-Fi Services
- Web Authentication
- EAP-SIM Authentication
- Dynamic Service Selection
Hotspot Deployment

- AP/MAG
- AP
- AP
- AP
- UE

WLC

PMIPv6

L3

GTP

LMA

ISG/1K

Internet

WLC/MAG

UE

1Q

IPSec

L3/L3VPN

IPSec

L3

L3

L3

Subscriber Policy Enforcement

LMA

GTP

MAG

PMIPv6

PMIPv6

L3

Subscriber Policy Enforcement
Hotspot Deployment

Client
- Smartphone user
- PC/Laptop user

Access Network
- AZR assigns IP. Client--ISG L3 network.

Service
- Web authentication for Unclassified IP session.
- RADIUS Proxy session with accounting from AZR.
Web Authorisation for SP Wi-Fi Access

Why is it needed?

- Web portal based access continues to be demanded by MNOs and Wi-Fi Access providers
- Many mobile devices do not have SIM cards or SIM-based clients apps
  - Wi-Fi iPAD and iPod touch are two major examples
  - Will every Wi-Fi connected device get a SIM? When?
- BYOD will be a major use case for Wi-Fi access going forward
- Exploit visiting “non-subscribers” – a good “churn” opportunity for you
  - Need a portal login and splash page to offer your service
WEB Authentication Call Flow

Open association

Device

Association (1)

AP

Association (2)

WLC

DHCP Discover (3)

AAA

DHCP Offer (5)

DHCP Relay (4)

DHCP Request / ACK (6)

DNS Query (7)

DNS Response (9)

HTTP Request (10)

HTTP Response (11)

User Login (12)

Portals

Unauthenticated Session

User Profile cached

Authenticated Session

Device

Open association

WLC

DHCP

Unauthenticated Session

Authenticated Session

Portal

Internet

AAA

DHCP

Unauthenticated Session

Authenticated Session

Device

Open association

WLC

DHCP

Unauthenticated Session

Authenticated Session

Portal

Internet

User Login (12)

RADIUS Auth (14)

Radius Acct Start (16)

L4 Re-direct

DNS Response (8)

DNS Query (8)

RADIUS CoA (13)

CoA Ack (15)
ISG with DHCP Session Trigger

- Client/Subscriber on a smartphone/tablet/laptop associates to an available WLAN SSID on an AP and initiates DHCP DISCOVER.
- Once authenticated subscriber will be assigned a Pay Per Use Standard High Speed service.

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<tr>
<th>Address Assignm.</th>
<th>Session Initiator</th>
<th>Interface</th>
<th>Authentication</th>
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<tr>
<td>DHCP ISG is DHCP Relay</td>
<td>DHCP</td>
<td>GE (.1Q)</td>
<td>TAL (mac address) w/ Web Logon fall back for Self Subscription</td>
</tr>
</tbody>
</table>
DHCP Session Initiator: Call Flows

1a. DHCP Discover

1b. DHCP Discover

1c. DHCP Exchange

2. ISG session creation

3. PBHK service applied (*)

4a. Access-Request
   username = mac

4b. Access-Reject

5. OpenGarden and L4R services applied (*)

6. Authentication Timer started

(*) assumes that the definition of PBHK, L4R and OpenGarden are already available on the ISG

interface GigabitEthernet 0/0.1
encapsulation dot1Q 10
ip address ...
service-policy type control IP_SESSION_RULE1
ip subscriber l2-connected

initiator DHCP

policy-map type control IP_SESSION_RULE1
<snip>

3. class type control always event session-start

4a. 10 service-policy type service name PBHK_SRV

4b. 20 authorize aaa list IP_AUTHOR_LIST
   password cisco123 identifier mac-addr

5. 30 service-policy type service name OG_SRV

6. 40 service-policy type service name L4R_SRV

50 set-timer AUTHEN_TMR 10
## PMIPv6 Based Deployment for Packet Core Integration

### Connectivity
- L2-connected network
- DHCP initiated
- Offload: Unclassified MAC & RADIUS Proxy initiator

### IP Addressing
- IPv4, IPv6 or Dual-stack Clients
- Simple IP User Internal DHCP
- Mobile IP User from LMA

### Services
- Open Access Wi-Fi Services (Simple offload)
- Web Authentication, EAP-SIM/AKA
- Dynamic Service Selection
PMIPv6 Based Deployment for Packet Core Integration
Packet Core: 4G/PMIPv6 Integration into PGW

FSOL: RADIUS/Unclassified MAC, Tunnel Technology PMIPv6
Packet Core: 4G/PMIPv6 Integration into PGW

Call Flow Overview

- **802.1X**
  - EAP Negotiation
  - EAP Authentication / Authorisation

- **DHCP Discover**
  - DHCP Relay
  - Radius.Req
  - Radius.Accep

- **DHCP Offer (IP Address IP1, Mask, GW, DNS)**
  - DHCP Request / Ack IP1

- **User Record Cached**
  - ASR1K MAG
  - PMIPv6 Trigger User
  - Authorised LMA/NAI
  - Downloaded

- **PBA: IP1**
  - Gx/Gy: CCR
  - Gx/Gy: CCA

- **Binding on LMA for Client**

- **Policy & Charging**

- **Internet**

- **Cisco Public**
# GTP-based Deployment for Packet Core Integration

<table>
<thead>
<tr>
<th>Connectivity</th>
<th>• L2-connected network</th>
<th>• DHCP initiated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Offload: Unclassified MAC &amp; RADIUS Proxy initiator</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IP Addressing</th>
<th>• Simple IP User Internal DHCP</th>
<th>• Mobile IP User from GGSN</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Services</th>
<th>• Open Access Wi-Fi Services (Simple offload)</th>
<th>• Web Authentication, EAP-SIM/AKA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Dynamic Service Selection</td>
<td></td>
</tr>
</tbody>
</table>
GTP-based Deployment for Packet Core Integration

- GTP
- Subscriber Policy Enforcement
- L3

- LMA
- WLC
- MAG
- AP/MAG
- AP
- AP
- AP

- UE
- IPSec
- L3

- PMIPv6
- L2 Subscriber Policy Enforcement

- Internet
Packet Core: 3G/GTP Integration into GGSN

- Broadhop QNS
- Sub DB
- QNS AAA
- CAR 6.0
- HLR
- GGSN (ASR5K)
- OCS
- PCRF
- Gx
- Gy
- 3G Core
- WLC
- VLAN
- iWAG
- Authentication & Authorization
- Radius
- SGTAN
- GTPv1 / Gn
- RADIUS
- AP
- AP
- AP
- AP
- AP
Packet Core: 3G/GTP Integration into GGSN

Possible Inter-Op Scenarios with third party:
- WiFi AAA
- MNO AAA
- GGSN
- PCRF

Components:
- WLC
- eWAG (ASR5K)
- GGSN
- Internet
- AP
- WiFi AAA (CAR)
- PCRF
- MNO AAA (CAR)
- ITP
- CAPWAP
- Gx
- MAP/M3UA
- HLR
- EAP-SIM Authentication Authorization WiFi Accounting
- RADIUS Accounting based PDP Context Start
- Authentication Authorization Accounting
Packet Core: 3G/GTP Integration into GGSN

Call Flow Overview

- 802.1X
- EAP Negotiation
- EAP Authentication / Authorisation
- DHCP Discover
- DHCP Relay
- DHCP Offer (IP Address IP1, Mask, GW, DNS)
- DHCP Request / Ack IP1
- Rad. Acc. Req.
- Proxy adds User Info
- Radius. Acc. Req.
- Radius. Acc. Resp.
- Build NAT for User IP1:IP2
- GTP: CPC
- GTP: CPC IP2
- Internet
- CiscoPublic
Case Studies and Customer Deployments
Cable/MSO: Cablevision

224,000 Brand Impressions per day
1,000,500 devices detected, 596,000 are iOS

Separate use cases for device categories:
Laptop, Tablet, Phone

Use cases Deployed: Branding, App Promo

- Cablevision Setup
  - Serve at beginning of session, every 5 min.
  - iOS devices get App promo as first imp
  - Average serve rate of 1-3 impressions per day per surfing device.
  - Workdays are 30-40% more active than holidays, snow days or weekends.

- Scales for device
- Animation effects
- Anchor to any corner
- Supports transparency
- Timed entry and exit
Connected Stadium – Super Bowl XLVI

- Fan facing Wi-Fi access for Super Bowl activities
- Carrier-neutral Wi-Fi access – free to all fans
- Provided by Verizon wireless
- Objective: enhanced fan experience and 3G offload
- High speed data as well as Voice & SMS worked well
- 604 in-stadium Access Points

Downstream
- Peak: 75 Mbps
- Total: 225.3 GB

Upstream
- Peak: 42 Mbps
- Total: 144.6 GB

Total attendance: 68,658
Unique Associations: 12,946 (19%)
Simultaneous access: 8,260 (12%)
Venue: Fernbank Museum with AT&T
Transforming Visitor Experience with Personalised, Managed Wi-Fi

- Personalised Tour Guide
- Location-based context help / Analytics
- Promotions / Attractions

Hi, I am Jack. I'll be your tour guide today. Hear that Roar?

Congratulations Jessica! You are now a Junior Paleontologist!

Which animal lived in the mighty Red Oak?

A.
B.
C.

Which animal lived in the mighty Red Oak?

Here are some recommendations from our Gift Shop!

Please Follow Route to find NatureQuest

A.

Which animal lived in the mighty Red Oak?

B.

Which animal lived in the mighty Red Oak?

C.

Which animal lived in the mighty Red Oak?

Get 10% OFF with your QR Code

Share Results

Congratulations Jessica! You are now a Junior Paleontologist!

Get 10% OFF with your QR Code

Share Results

Congratulations Jessica! You are now a Junior Paleontologist!
Copenhagen Airport
Aid Travellers through Wi-Fi Services

What’s New
• Location Analytics with ThinkSmart

- Security Personnel
- Check-In Personnel
- Customs Personnel
- Traffic Flow
- Advertising Placement
Summary & Takeaways
Key Take-away: SP Wi-Fi is all About Optimising/ Monetising for Providers

- Mobile wireless data is exploding
- SPs are looking at Wi-Fi as a way to optimise their network, reduce customer churn and increase revenue opportunities
- SP Wi-Fi access is a business reality today for ALL providers
- Rich service management needed for subscriber differentiation and monetisation
- There is no single solution for all access types, but all types of access should be supported at the service layer
- An end to end architecture must provide services for different deployment models
- The results of a good deployment will deliver outstanding user experience
Cisco e2e Product Portfolio for SP Wi-Fi

WAG, GGSN, PGW, ePDG, TTG: Cisco ASR5K

WAG & ISG: Cisco ASR1K/9K

Indoor Access Points: Cisco Aironet 3600 Series

Outdoor Access Points: Cisco Aironet 1550 Series

Wireless LAN Controllers: Cisco 5500/8510 WLC

WLAN Management: Cisco Prime (NCS)

AAA: Cisco Access Registrar (CAR)

Server: Cisco UCS
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