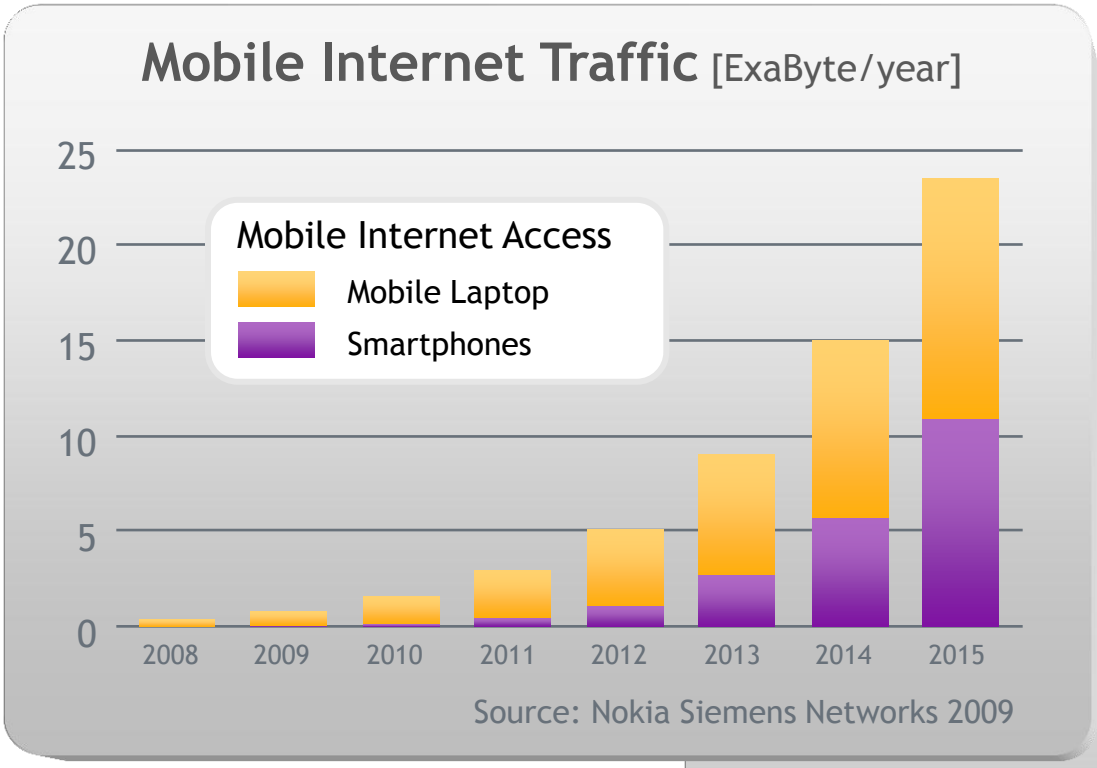
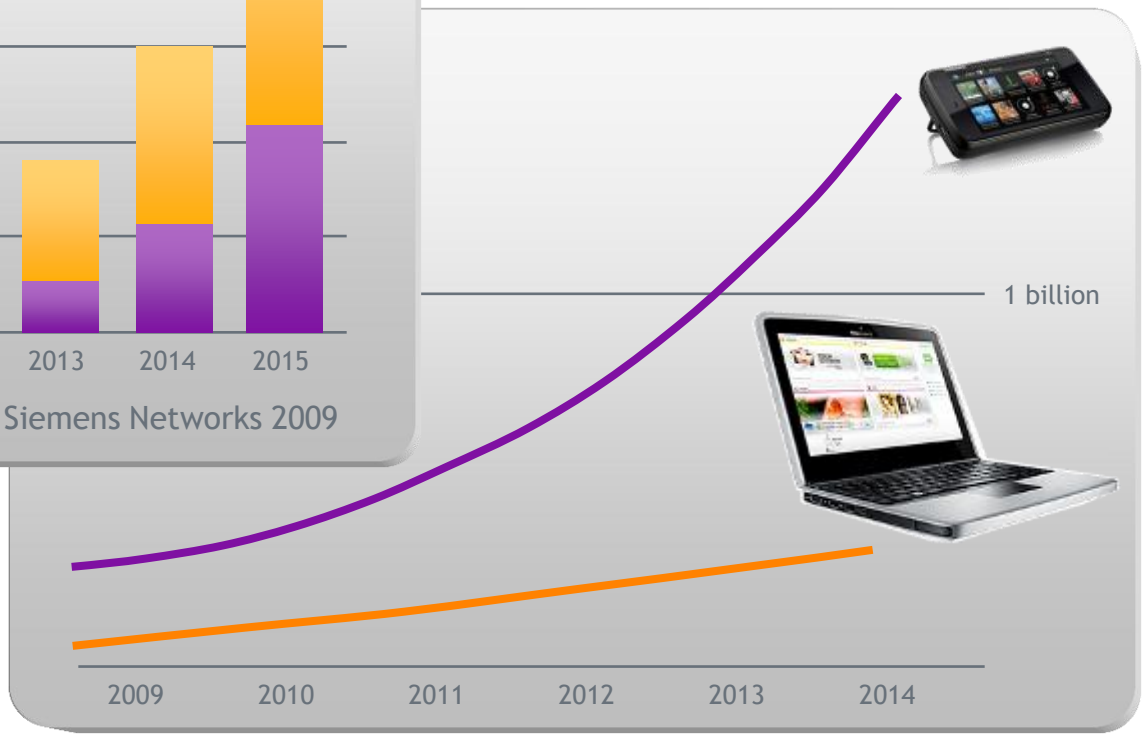
Smart WLAN Connectivity solution

Agenda

- Solution overview and phases
- Products and their benefits
- Device compatibility
- Residential Wi-Fi access
- Conclusions
- Additional information

Market Trends

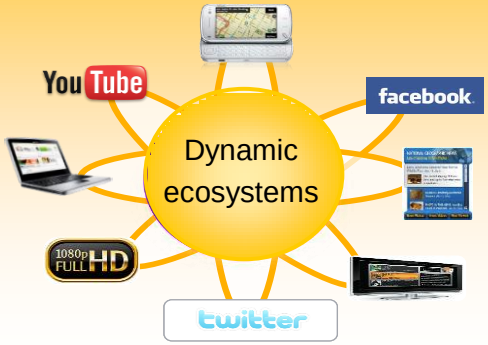




Wireless broadband and new device technologies change the way people communicate

Source: Analysis Mason

By 2015 more than 90% of wireless traffic will be data



Source: ABI research

60-70% of traffic is estimated to be generated indoors

People expect ease of use, speed and responsiveness

As mobile data revenue is not expected to grow the same pace as the traffic, this drives the need for cost reduction and optimization in access provision

Key questions the operators are facing

- How to provide x Mbit/s mobile broadband connections for my users
- How to cope with increasing bandwidth demand set by the services, like video (13.1.2011 Google reports 200 million Youtube streaming hits/day)
- How to improve indoor (also outdoor) coverage and capacity
- How to match or exceed competitor service quality especially for VoIP & video
- Etc.

- Add more 3G capacity
- Upgrade to HSPA / LTE
- Use Femto cells

Many operators are also looking to use Wi-Fi to help them

Using Wi-Fi to help and to complement cellular networks

- Wi-Fi networks are widely available and mandatory wireless technology for many devices
- Wi-Fi can be widely used as smart phones, tablets and laptops support it
- 60-70% of traffic is estimated to be consumed indoors where Wi-Fi provides strong connectivity

Key Wi-Fi use cases

Home

Using Wi-Fi and fixed broadband access at home

Hotspot

Using CSP's own or partner hotspot when on the move at stadium, cafe, airport, hotel, abroad, …

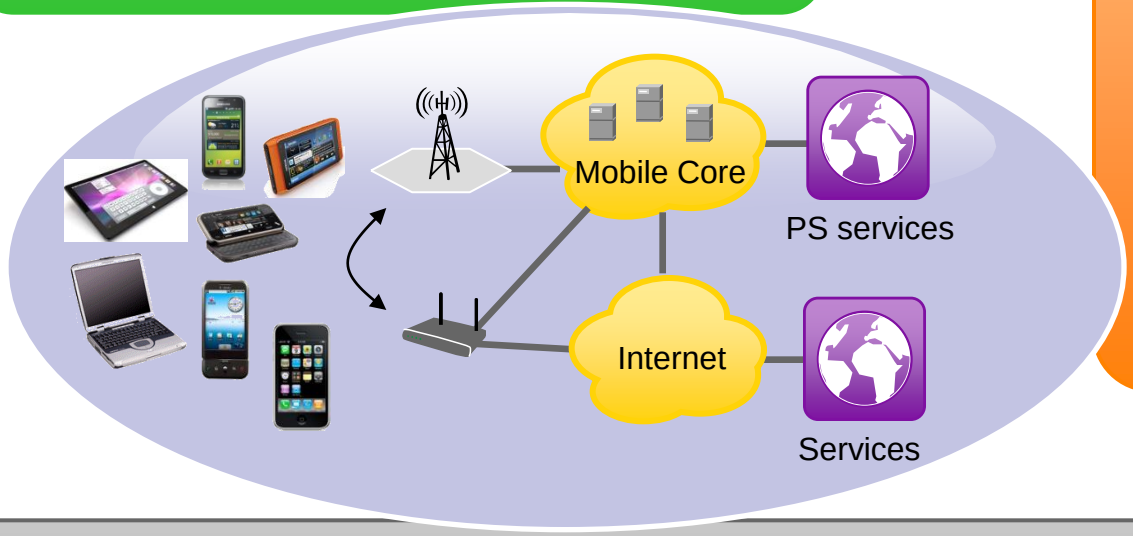
Guests at home

Using your friend's Wi-Fi when visiting them

Smart WLAN Connectivity solution turns Wi-Fi networks into seamless extensions of mobile network

End user benefits

- Faster data connections
- Wi-Fi is as easy to use and secure as 3G
- Extended coverage



Operator benefits

- Carry larger volumes of traffic and support a higher number of end users
- High performance indoor coverage and capacity by leveraging Wi-Fi
- Increased customer satisfaction
- Retain position in traffic value chain and control over user experience for Wi-Fi access

- 3GPP standards based solution ensuring compatibility to large number of devices and easier integration in multi-vendor networks
- Overlay solution compatible with 2G/3G/HSPA/LTE and existing Wi-Fi

Building blocks

Device Management
Automated Settings Configuration

Automatic switching between 3GPP/ Wi-Fi
Selective offloading the traffic to Wi-Fi

Authentication Authorization Accounting
Authentication & Charging support

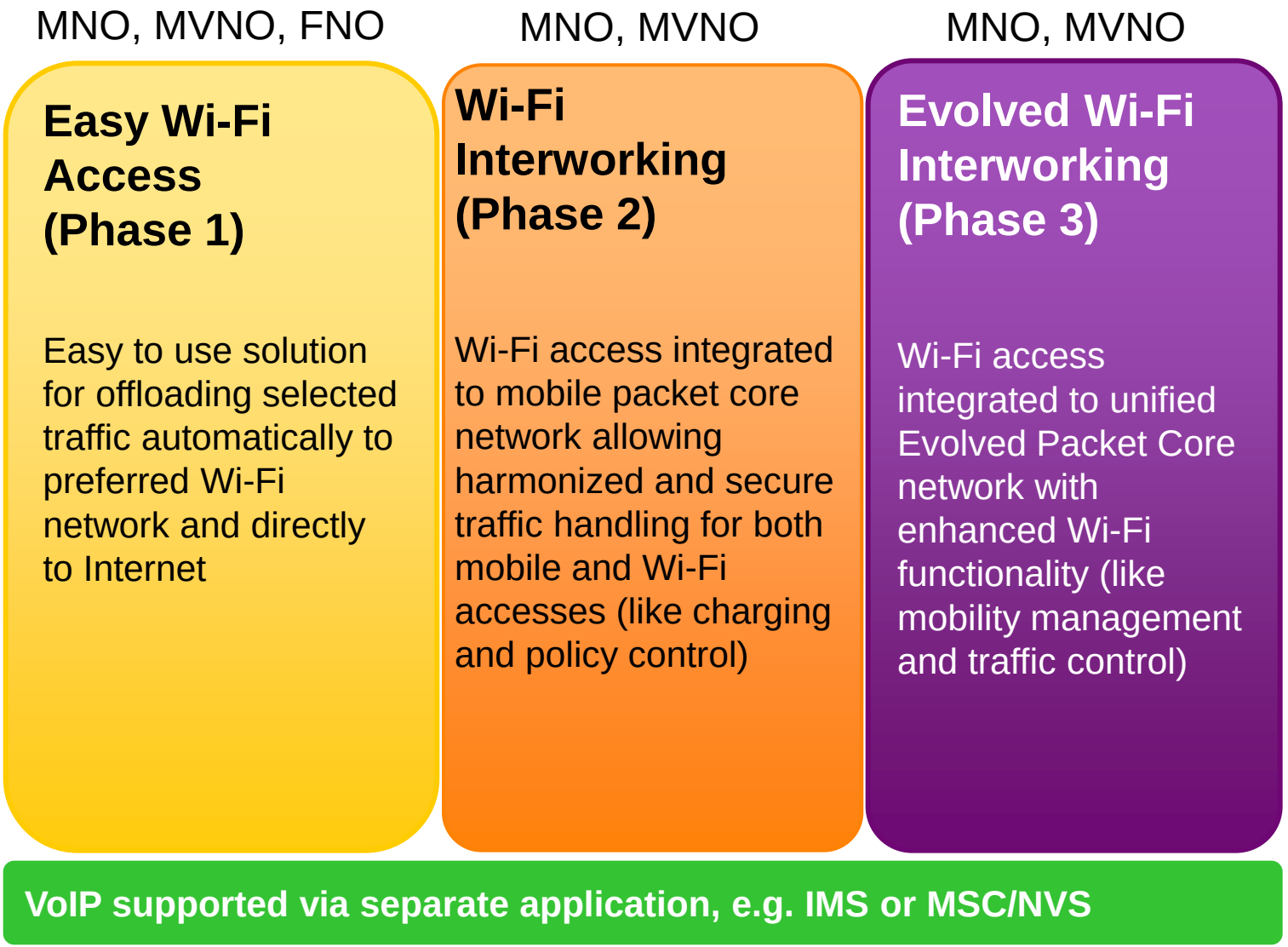
Integrating Wi-Fi access into mobile core
Access to services via cellular and Wi-Fi

Policy control
Fair network resource usage for Wi-Fi access

Mobile Quality Analyzer
Understanding user behavior

Used to seamlessly offload the traffic from mobile network to Wi-Fi Network

Solution value packs



Phased approach for Wi-Fi offload

Phase 1: Direct IP Access with EAP-SIM / portal authentication
- Automatically switching between mobile and preferred Wi-Fi networks.
- Transparent and robust EAP-SIM authentication for smart phones and tablet.
- Routing traffic directly to Internet bypassing mobile radio and core networks.

Phase 2: Integration of Wi-Fi access into mobile packet core, via TTG, on the way towards EPC
- Data encryption and integrity over Wi-Fi networks.
- Enabling mobile and new (like mobile HDTV) services over Wi-Fi networks.
- Reusing existing packet core service infrastructure for Wi-Fi provides CAPEX savings.

Phase 3: Unified EPC based packet core network
- Enhanced mobile/Wi-Fi interworking.
- Supporting at the same time legacy (phase 2) and new EPC capable devices ensuring smooth evolution towards LTE.

VoIP is supported and complemented via a separate VoIP application, like IMS.

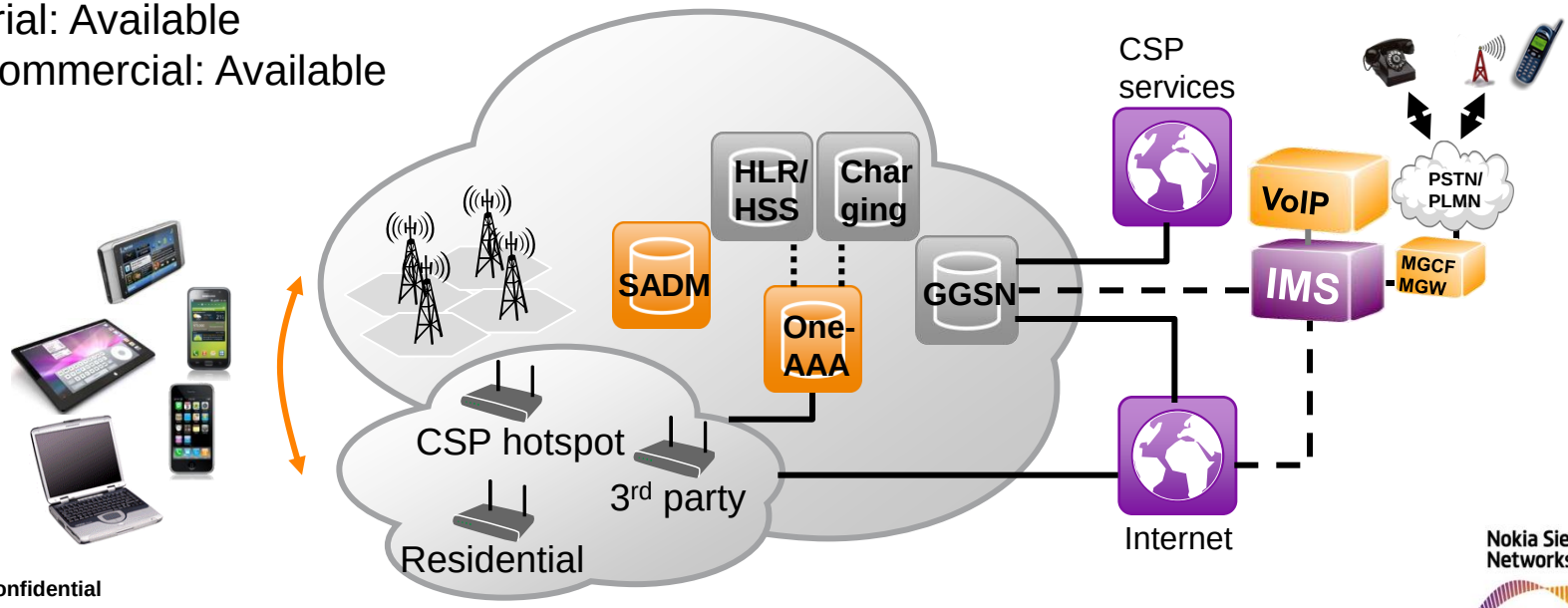
Easy Wi-Fi Access (Phase 1)

SADM (Serve at Once Device Manager)
- Automatic settings configuration; SSID, PSK, EAP-SIM authentication method etc.
- (pre-)ANDSF ensuring compatible devices connect automatically to preferred Wi-Fi networks

One-AAA (Authentication, Authorization, Accounting)
- Transparent and robust 802.1x, including (U)SIM based and protected EAP, authentication for smart phones, tablets and net books avoiding manual login
- Captive portal or WISPr authentication for other Wi-Fi capable devices
- User QoS profile supported for compatible Wi-Fi APs

VoIP option (IMS used as example)
- Enhanced VoIP services for consumers and business users including Voice Call Continuity

Trial: Available
Commercial: Available



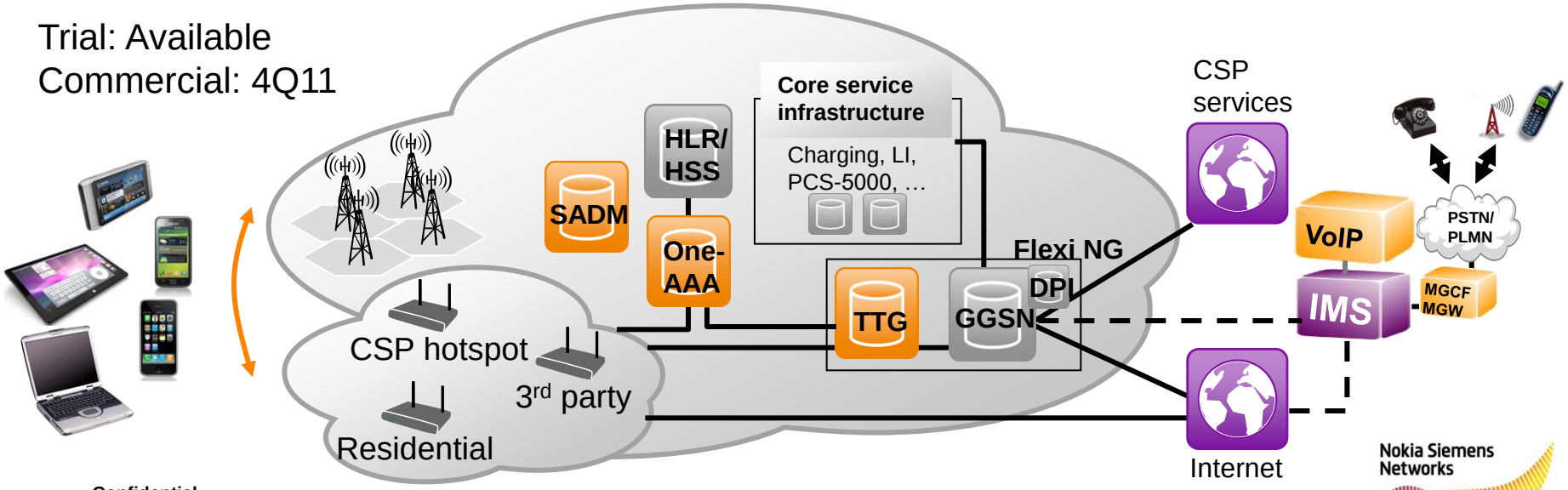
Wi-Fi Interworking (I-WLAN, Phase 2)

SADM & One-AAA & IMS VoIP
- See Phase 1

Flexi NG TTG (Tunnel Termination Gateway)
- Terminates I-WLAN IPsec tunnels from devices; Data encryption and integrity over all Wi-Fi networks
- Connects to GGSN via PDP contexts and Gn interface
- Split tunneling option; E.g. connecting CSP service traffic to packet core and routing YouTube video streaming directly to Internet

Flexi NG GGSN
- Reusing existing packet core service infrastructure (charging, deep packet inspection, policy control etc.) for Wi-Fi provides harmonized traffic handling for both access types
- Makes also CSP mobile data services available over Wi-Fi networks; mobile TV, web portal, etc.

Trial: Available
Commercial: 4Q11



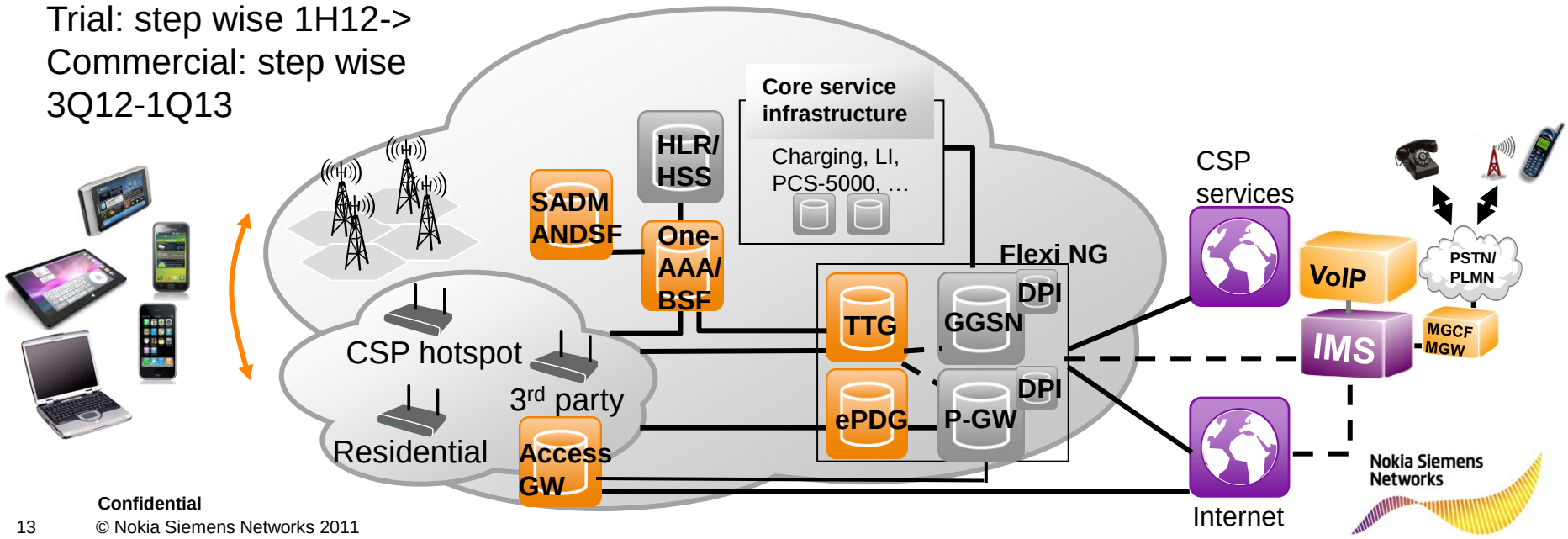
Evolved Wi-Fi Interworking (unified EPC, Phase 3)

SADM & One-AAA
- Enhanced 3GPP/Wi-Fi interworking functionality, for example control over Wi-Fi use

Flexi NG TTG & GGSN
- See Phase 2, supporting non-LTE devices and ensuring smooth evolution towards LTE

Flexi NG ePDG & P-GW (evolved Packet Data Gateway, Packet Data Network Gateway)
- ePDG: Data encryption and integrity via IPsec tunnels over all Wi-Fi networks
- Robust application connections via service continuity support with for example option to steer selectively traffic between mobile and Wi-Fi networks
- Reusing existing packet core service infrastructure for Wi-Fi provides harmonized traffic handling for both access types, enhanced policies with **PCS-5000** (PCRF) for Wi-Fi access
- Supporting untrusted and trusted Wi-Fi networks in P-GW

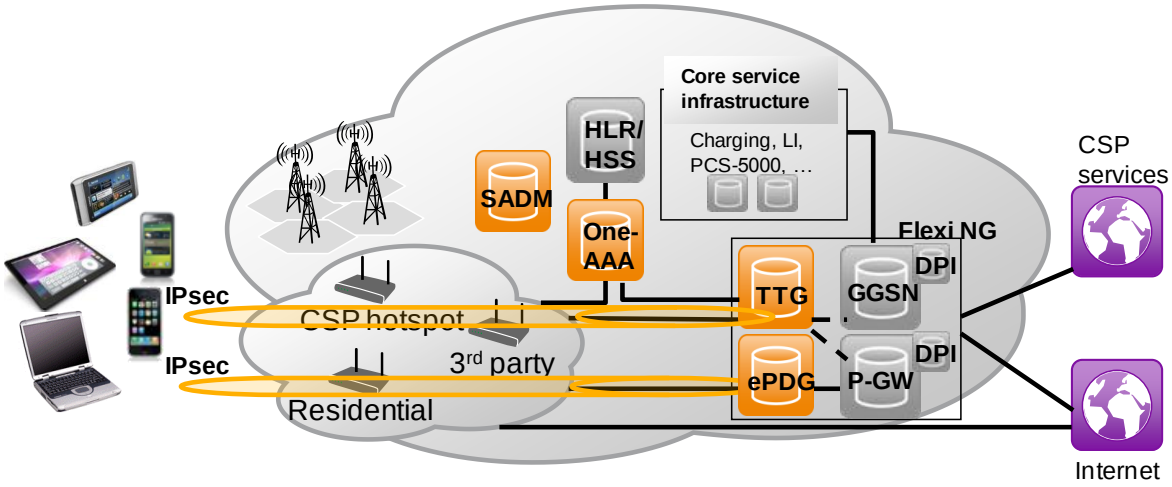
Trial: step wise 1H12->
Commercial: step wise 3Q12-1Q13



Trusted Wi-Fi approach (S2a) has benefits over Untrusted, however all existing Wi-Fi networks don't fulfill Trusted criteria

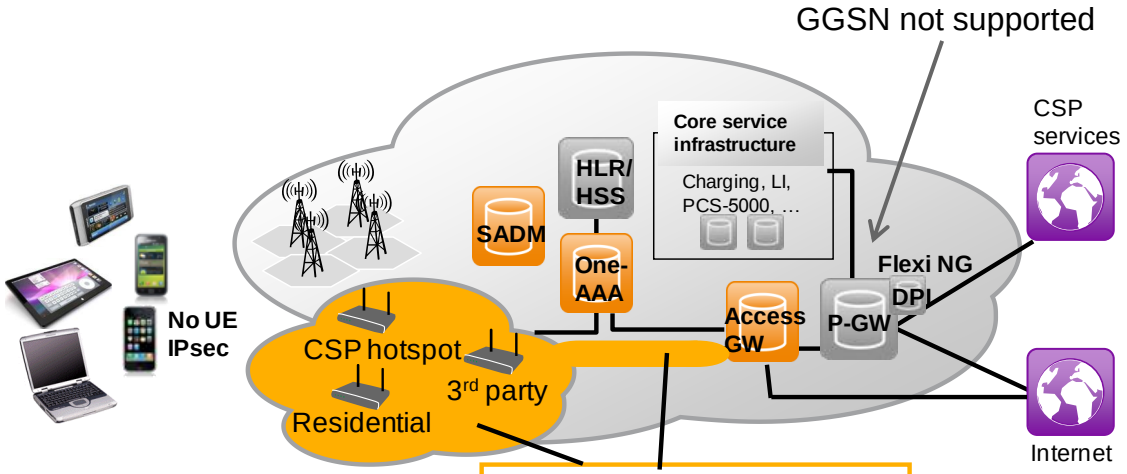
Approach for Untrusted Wi-Fi networks

+ Generically applicable for any Wi-Fi network, no impact to Wi-Fi networks
+ IPsec with strong authentication provides same security level as 3G, operator can be sure to which user IP packet belongs to in GGSN/P-GW, user can be sure nobody is able to monitor user traffic over Wi-Fi networks
- UE IPsec requirement



Approach for Trusted Wi-Fi networks

++ No impact to UE, no UE IPsec
+ Fits well for a network vendor with existing Access Controller / BNG -> enhance and introduce S2a
-Wi-Fi network and infra needs to Trusted to avoid misuse and traffic monitoring, all existing Wi-Fi networks are not Trusted
- Only P-GW supported, not GGSN



Example: If operator has hotspot in hotel/cafeteria/…, Wi-Fi radio can be secured (WPA2-PSK), Wi-Fi backhaul can be secured (e.g. VPN), but what if somebody connects to AP itself…???

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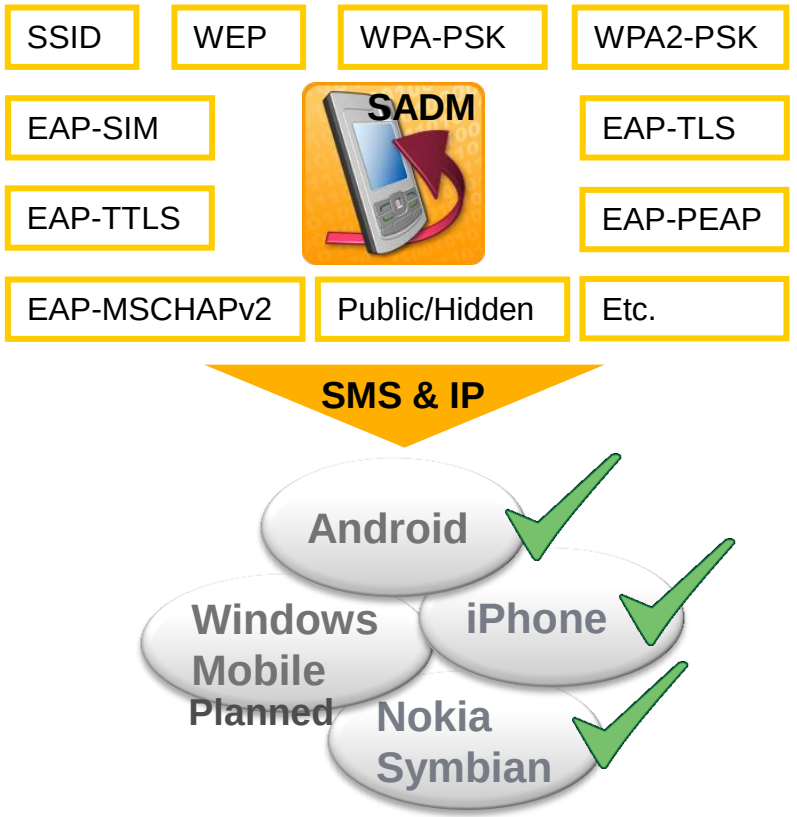
Serve at Once Device Manager

Benefits

- Over the air settings management offers superior user experience – seamlessly and reliably
  - Always up to date settings
  - Sometimes complex manual configuration, and errors coming with that, can be avoided
- Simplifies, even automates, use of Wi-Fi networks for the user
- Less need for service desk support



Example use cases:

- Automatic creation of CSP preferred Wi-Fi networks into user device
- Ensuring iPhone, Android and Nokia connects automatically to preferred Wi-Fi networks when user starts an application

SADM 8.0 onwards

SADM based standardized ANDSF to control automatic use of preferred Wi-Fi networks

Benefits

- Boosts ease of use by automating Wi-Fi network selections
- Ensures user devices connect to Wi-Fi networks according to CSP (and user) preferences
- Proactively avoids congestion in mobile networks
- 3GPP rel-10 ANDSF providing ability to selectively offload some traffic (e.g. Internet) to Wi-Fi while keeping other traffic in mobile

Priority list

1. Home
2. CSP hotspot
3. Partner hotspot
4. Mobile network

Additional criteria

- Time of day
- Location
- Application based selection

Example use cases:

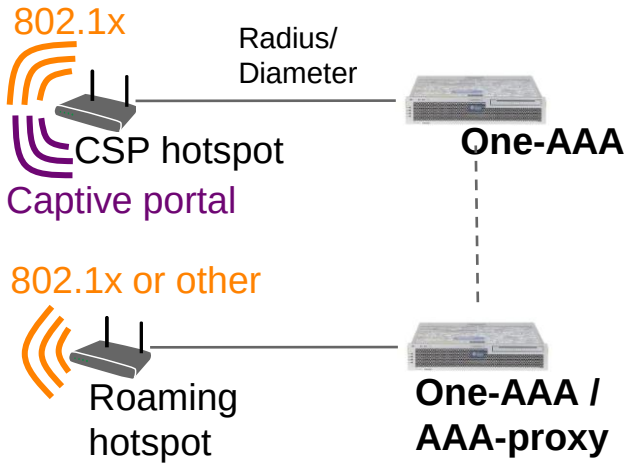
- Keep user in 3G but offload to Wi-Fi near train station to ensure volume based charging and avoid mobile congestion
- Ensure user device uses first own and only then roaming partner hotspots when both are available

SADM 9.0 onwards

One-AAA for Wi-Fi access Authentication, Authorization and Accounting

Benefits

- 802.1x based hotspot authentication for robust, secure and user friendly authentication
  - Captive portal and WISPr are options as well
- Supports EAP-SIM / EAP-AKA authentication when integrating Wi-Fi access to packet core
- Roaming, charging and user QoS profile support
- Unified authentication infrastructure for non-3GPP access (Wi-Fi, x-DSL, …)



Example use cases:

- 802.1x authentication allowing One-AAA and user device to negotiate between EAP-SIM, EAP-AKA, EAP-PEAP, EAP-TLS => Using best supported method hiding authentication from the user
- Using dual SSID in hotspot to provide 802.1x/EAP-SIM for iPhones etc. and Captive Portal for legacy devices, voucher/credit card access etc.

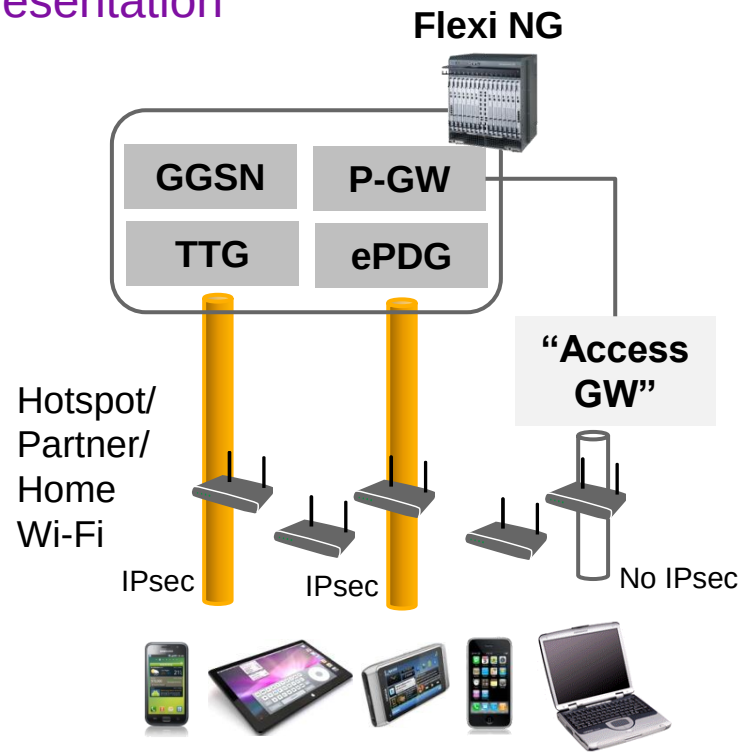
One-AAA 5.0 EP3 onwards

Flexi NG for integrating Wi-Fi access to packet core

More details during Flexi NG presentation

Benefits

- Reusing existing packet core service infrastructure for Wi-Fi access provides CAPEX savings and harmonized traffic handling for both mobile and Wi-Fi accesses
- Secure overlay solution between device and TTG/ePDG not affecting on existing Wi-Fi networks
- Service continuity (IP address preservation) supported for robust and good quality connectivity
- Supporting existing and new 3GPP release 8 (EPC) onwards devices



Example use cases:

- 3G like secured connections over any Wi-Fi
- Visibility over traffic and maintaining tighter subscriber contact
- Using volume based charging, fair use policies, parental control, DPI etc. to Wi-Fi access, unified user experience

TTG: Flexi NG TTG 1.1.0 onwards
Access GW & ePDG: Flexi NG 3.0 candidate

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End user device compatibility summary

Functionality/ Platform	Symbian ^3 & S60 3.2-> 	Android 2.x-> 	iOS 3.x-> 	BlackBerry OS 5.0-> 	Windows Phone 7 
Device Management	Supported (OTA-CP, OMA DM)	Supported 09/11 (proprietary)	Supported (proprietary)	Not supported as requires BES (*)	Support planned
Automatic selection of preferred Wi-Fi	Pre-ANDSF supported, ANDSF expected later	Pre-ANDSF supported, ANDSF expected later	Pre-ANDSF supported, ANDSF expected later	ANDSF expected later	ANDSF expected later
Available AAA methods	EAP-SIM, 802.1x, Captive portal	EAP-SIM**, 802.1x, Captive portal	EAP-SIM, 802.1x, Captive portal	EAP-SIM, 802.1x, Captive portal	No EAP-SIM, 802.1x, Captive portal
3GPP I-WLAN and VPN support	Supported	Supported***, VPN available	I-WLAN not supported, VPN available	Supported	I-WLAN not supported, VPN available
3GPP EPC support	Support expected later	Support expected later	Support expected later	Support expected later	Support expected later

*) Blackberry Enterprise Server
**) Birdstep client (available) or Android 2.3.5 SW patch for EAP-SIM
***) Birdstep client (Also other clients available on the market)

Main gap currently being solved

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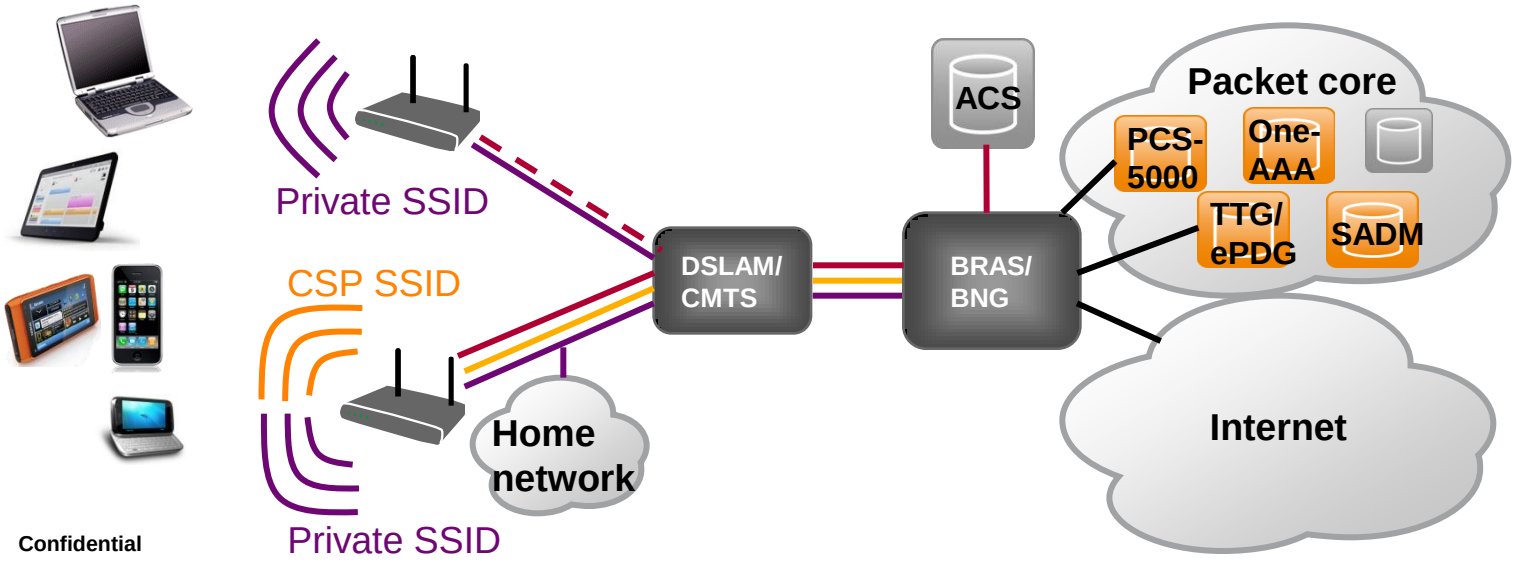
Adding value to residential Wi-Fi access, examples

- Plug&play residential Wi-Fi access for every family member
  - Wi-Fi AP auto-configuration and Wi-Fi settings provision to user devices
  - Ensuring traffic offload to residential Wi-Fi when at home
- Enabling CSP mobile services via home Wi-Fi network, like mobile TV, IMS services etc.
- Extending network capacity by turning portion of residential Wi-Fi AP into a hotspot (using second SSID) that may be accessed by CSP subscribers
  - Visitors connecting to CSP SSID are not allowed to connect to home network
  - CSP SSID may use for example 802.1x authentication, I-WLAN/EPC, etc.



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Smart WLAN Connectivity solution benefits

- Allows to carry larger volumes of traffic and support a higher number of end users
- Enables easy to use, secure and fast connections over Wi-Fi improving user experience
- Retains the operator position in the traffic value chain and control over user experience for Wi-Fi access
- Improves indoor coverage with fast and seamless Wi-Fi access
- Preserves macro network capacity to improve user experience in cellular network as well

Smart WLAN Connectivity solution unifies cellular and Wi-Fi networks into a seamless experience, providing clear business benefits to operators

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