The Femto Forum

Services Special Interest Group

Femto-Awareness for Handset Applications

What is the 'Femto-Awareness for Handset Applications' initiative?

The Femto Forum services SIG is focusing near-term effort on creating the building blocks for femtocell awareness in handset-hosted applications. The aim is for a framework where:

- femtocell awareness may be exposed as an API in a wide variety of developer SDKs, including native applications for common smartphone and feature phone operating systems, J2ME, widget toolkits and JavaScript:

- implementations may be incorporated into the handset operating system and will work with any network operator providing service to the handset:
- deployment is supported for handsets and mobile networks already in service today, without depending on future radio standards:

- In the future this initiative will also leverage the network evolution defined by 3GPP 3GPP2 & WIMAX particularly the handset's radio layer femto-awareness capability.

What femtocell capabilities are new consumer applications built upon?

Depending on operator, femtocell deployments will feature:

- local connectivity: for example to TV set-top boxes and PCs to sync, share and play content;
- improved performance: without the contention or weak-signal performance degradation of the macro network;
- differential tariffs: 'home tariffs', particularly those which offer mobile subscription deals to the whole household, will likely have discounted or free home usage elements;

- ease of use: compared to WiFi, connectivity in licensed spectrum is managed by the operator, and avoids the user having to enter security keys or suffer quality degradation when their neighbours install access points. Connection to a femtocell is seamless and transparent to the handset user; and

- proximity: because femtocells provide short range coverage, when a handset is connecting to one the context (e.g. 'at home' or 'in office') and geo-location may be inferred.

Why the focus on handset applications?

The handset application market is thriving. The iPhone has been a game-changer; by coupling user interface innovations with the App Store it has transformed consumer habits for using data services and installing aftermarket phone apps. The channel to market and incentive created for developers has driven a surge of new phone applications. A plethora of new Android models in 2010 is likely to see smartphone and feature phone functions penetrating much further down the price points in handset manufacturers' ranges than ever before.

There are different types of femtocell applications. Some use intelligence within the femtocell system, such as presence triggers, to send notifications or influence call routing, but the infrastructure to support them will take time to develop and standardise. Many applications are handset-hosted, and femtocell-awareness is an addition to the palette of functionality available to developers which the femtocell industry can deliver quickly.

What is 'femto-awareness' for applications?

It is the ability of an application running on a handset to distinguish between femtocell and macro network coverage in much the same way as existing applications distinguish between 3G and WiFi coverage. There are applications on smartphones today which only run on a WiFi connection because they require the implicit low cost and/or connectivity to devices in the local network which WiFi provides. Many of these applications could also run using connectivity provided by a femtocell.
Femtocell awareness has two steps:

- passive detection provides basic femto-awareness by using the handset's constant search for the best cell to identify the event of the handset camping onto a femtocell. Femtocells are recognized by comparing the observed Cell-ID and/or Location Area Code to a known set assigned by the network operator to their population of femtocells; and

- active interrogation is the handset initiating a brief packet data session when it arrives on a femtocell to get details about the capabilities and privileges of the available connection femtocell awareness APIs will provide a query mechanism for applications running in the foreground and a wake-up trigger to idle applications running in the background. The Basic Awareness API can be implemented using only passive detection, while the more feature-rich Capability Awareness API requires active interrogation working in tandem with passive detection:

Foreground Process
Background Process
Basic Awareness
Is this UE in femtocell coverage?
Wake process when in femtocell coverage
Capability Awareness
What connectivity can the femtocell provide (Internet|LAN|Operator)?
What type of femtocell is this (consumer|enterprise|public)?
What is the access control policy of this femtocell (open|semi-open|closed)?
What privilege does this UE have on the femtocell (guest|member|owner)?
Wake process when in coverage with specific connectivity|type|role

Which applications can use femtocell-awareness?

Example applications include:

- **Cache & Carry Media**: Podcasts, recorded TV, or other subscription content stored on a set-top box or home media server can be transferred to the handset using the lower cost, higher bandwidth provided by femto's (all devices are connected to the home LAN). No user interaction is required, avoiding the need to use

the restricted user interface of a feature phone. And avoiding having to perform cumbersome side loading (using cables or removable media) from a PC. Fresh content is available on the handset to be consumed whenever needed.

- **User-Generated Content Upload/Backup**: The inverse of cache & carry: photos and videos captured on a media phone are uploaded for sharing on social network sites, backup to secure storage, or processing by a print service when it is optimal to do so, avoiding the network contention when providing connectivity at lower cost and higher bandwidth provided with femtocells.

- **IMS Rich Presence Client**: IMS-capable UEs can share rich presence status between users, such as status of the user (i.e. 'available', 'busy', 'offline'), status of the UE ('silent') or context of the UE ('outside', 'at home', 'at work'). Some status updates such as 'at home' can be derived from femtocell coverage awareness.

- **DLNA Audio-Visual Client**: The Digital Living Network Alliance define use cases for a mobile device connected to a local network via a Bluetooth or WiFi access point to discover other audio-visual media devices in the LAN. The mobile device can interact with a second device to serve it streamed content, copy content to or from it, or render media streamed from the second device. The mobile device may also act as remote to initiate and control sessions where media storage and rendering occurs on other devices in the network. All of these use cases are similarly desirable when the access point is a femtocell.

What is the current development status?

Basic femto-awareness has been demonstrated by several access point vendors collaborating on a common implementation of passive femtocell detection. Two handset software vendors have demonstrated end-user applications:

- Intrinsyc Inc's Ux-Zone gives visual feedback to the user when in femtocell coverage by changing the theme of a smartphone, including different wallpaper and application icons on the home screen

- Mobica Ltd's Podcast application for feature phones automatically downloads any new content on a podcast feed whenever the phone arrives home, storing it for the user to listen to offline

What remains to be done before commercial femto-aware applications can be deployed?

Applications using basic femto-awareness can be deployed immediately, but will require an operator-specific mechanism for provisioning identifiers used by the handset to distinguish femtocells from the macro network. The Femto Forum is defining a services framework to enable femto-aware applications that can be reused across femto access points, devices, handset operating systems and wireless carriers.

Capability awareness is an enhancement that will follow once forum members agree and implement standards for the capability query protocol.

You mentioned network evolution?

Having functionality at the application layer to distinguish femtocells from the macro network is essentially a workaround because today's deployed 3G networks do not make the distinction in the radio management layer. Once mechanisms such as closed subscriber groups in UMTS R8 are deployed, this workaround will become redundant, and the passive detection phase of application femto-awareness will directly leverage the enhanced information from the radio layer.

I want to get involved – who do I contact?

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