smartSignaling Tech Allows 3G femtocell to Support up to 400 Devices

New smartSignaling features within picoChip's PC3x3 devices now enable up to 400 'always on' users on a femtocell with additional benefits such as longer handset battery life. "Everyone knows that mobile networks are filling up with data traffic generated by devices like BlackBerrys, iPhones or the iPad," said Rupert Baines, VP of Marketing at picoChip. "But what most people don't realize is that smartphones create problems even when they are not receiving or transmitting data. Their 'always on' signaling systems hurt the network more than just the extra data traffic, and can by themselves be enough to push a network to the point of collapse."

This phenomenon was documented in a recent report by Signals Research Group (SRG), "The Trouble with Twitters," which found that signaling traffic is actually outgrowing data traffic by up to 50%, largely due to the chattiness of typical smartphone applications such as push email, social networking, location-based services and the use of so-called 'keep alive' messages for other apps.

While femtocells do a very good job of creating more capacity, until now they have not addressed the signaling challenge. picoChip's smartSignaling feature adds specific functionality that eliminates this burden, enabling a femtocell to support many smartphones. By supporting special signaling states and adding shared channels, smartSignaling significantly improves network efficiency by relieving the burden of push email and applications on 'always connected' devices, especially important for femtocells in the enterprise or public areas.

First, the chip supports special handset 'sleep' modes. Handsets using these modes, specifically Cell_PCH, require many fewer signaling messages to 'wake up' and transition to a fully active state in which data can be transferred, reducing the effective demand on the network. Secondly, picoChip's PC3x3 devices also provide additional specialized channels for signaling information via Common E-DCH and Enhanced Cell_FACH functionality. This allows many devices to efficiently share the basestation and therefore picoChip-based femtocells support more 'always on' connections, particularly push-email systems.

By simultaneously increasing the effective signaling capacity within the cell and reducing the signaling required by each smartphone, these smartSignaling features add up to a substantial increase in the number of smartphones that can practically use a picoChip-based femtocell at any one time. In addition to 24 subscribers simultaneously talking or web-browsing using high-speed data (HSPA+), 400 'always on' users connected to the femtocell can remain in modes that are 'connected but not active'.

In addition to documenting the presence of excessive signaling traffic with numerous smartphone applications through the use of a sophisticated drive test

tool, SRG recognized that simply adding additional macro network capacity would not be an efficient or effective means of addressing the problem. Instead, it recommended several solutions, including the use of femtocells, Cell_PCH and the use of various HSPA+ features, such as Enhanced_FACH.

“The use of any of these three approaches goes a long ways toward addressing the issue of excessive smartphone signaling messages,” commented Michael Thelander, founder and CEO of Signals Research Group, LLC. “Clearly, bundling these three features together in one integrated solution represents a triple whammy that an operator will be able to leverage to both address congestion and to improve the user experience via higher end user data rates and increased smartphone battery life.”

Smartphones use a variety of techniques to improve battery life, in much the same way that a laptop has several power-saving-modes. However each time a smartphone moves between modes it needs to negotiate its new status with the network via the signaling system. Normal phones only signal occasionally - when they need to make a call, or move between cells - but a smartphone must repeatedly ’check in’ with the network to appear ’always on’ to the user, creating more burden on the network than traditional handsets.

“These features demonstrate that femtocells really are the best solution for carriers to increase both capacity and efficiency of their networks,” said Rupert Baines. “Conventionally, the femtocell community has talked of ‘users’ and has added more dedicated channels. But not all users are the same - picoChip-based femtocells can now support over 400 users on a single cell, solving the problems of network loading from push email and apps. Our PC3x3 chips support RX diversity, which significantly increases the usable radio capacity of the cell. With these new features, we can now also dramatically increase the number of smartphones in a cell.”

smartSignaling is particularly beneficial in very crowded cells, because signaling conflicts between smartphones can only be resolved by re-transmitting the signaling information. Crowded cells are therefore characterized by increasing numbers of failed ‘wake up’ attempts, which consume already scarce signaling resources, as well as eating into handset battery life for no user benefit. Femtocells are increasingly being used beyond residential applications, and are being deployed in enterprises, to add capacity in denser urban areas (metro Femto) or for coverage in rural locations. In all of these, the ability to support more users more efficiently is crucial.

smartSignaling is a firmware upgrade for picoChip’s PC3x3 picoXcell devices. picoChip’s technology is used in all of the significant commercial HSPA deployments to date, with over 25 customers using the picoXcell range.

A preview of the Signals Research paper, ‘The Trouble with Twitters’ is available to download from
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