

# Broadband

Broadband internet access has delivered a plethora of new services, ranging from social networking to new forms of entertainment, which could not have been imagined just five years ago. The next stage of growth in these services will occur as our ability to use them extends to anywhere, at any time. The mobile industry has invested heavily in developing new technologies that can deliver broadband experiences to users via their mobile phones. However, the cost of this infrastructure has, until recently, been limiting the capabilities of the networks. Today, we are on the verge of a major shift that will radically enhance what we are able to do via our mobile phones.

The mobile industry has built its infrastructure using a model that utilises many outdoor base stations. Each station can be used by many people, generating high revenue to pay back its high cost. The key differentiator that has seen the mobile industry grow to its current size is the ability to communicate wherever and whenever the user desires, so operators have needed to provide ubiquitous coverage, especially outdoors. Early mobile users selected landlines when indoors, because of the price difference for calls and familiarity with those phones. Conversely, many people now use their mobile phones indoors more than outdoors, either at home or at work, because this is the device they feel most comfortable with and it is a personal device. However, to get good coverage indoors from outdoor base stations is very costly. This is because the radio signal weakens as it penetrates buildings. Also, outdoor base stations are shared with many other users, so the available capacity can appear lower to each user, reducing the quality of the broadband experience.

The solution? A new generation of very small indoor base stations called 'Femto Base Stations'. These new Femto Base Stations are set to turn the mobile industry on its head. They will put the majority of mobile infrastructure indoors – directly into the homes of users and connected via a fixed broadband service to the mobile operator's network. Similar to a Wi-Fi access point, the Femto Base Station enables access for a small number of users to the mobile service they use outside. The benefit to the user includes clearer sound and faster broadband access when indoors at potentially much lower cost. The operator also benefits from greater customer loyalty, combined with the hope that users become addicted to advanced services at home that they then continue to use when out and about.

Cellular base stations were specified to be complex in order to simplify the handsets and make them low-cost. To be economic as a service, Femto Base Stations also need to be low-cost and this is a major technical challenge. Femto Base Stations need to be approximately one or two orders of magnitude below the cost of their outdoor equivalents. Of course, manufacturing volumes of Femtos can potentially be several orders of magnitude higher than their outdoor counterparts.

Cambridge Consultants has been active in developing early reference designs for this emerging Femto market, and we are seeing this become applicable to many standards, including 3G and WiMAX.

With the roll-out of Femto Base Stations, we are at last likely to see the promise of full broadband services on our mobile phones fulfilled.

**[Tim.Fowler@CambridgeConsultants.com](mailto:Tim.Fowler@CambridgeConsultants.com)**

reducing  
the cost of  
network  
infrastructure

