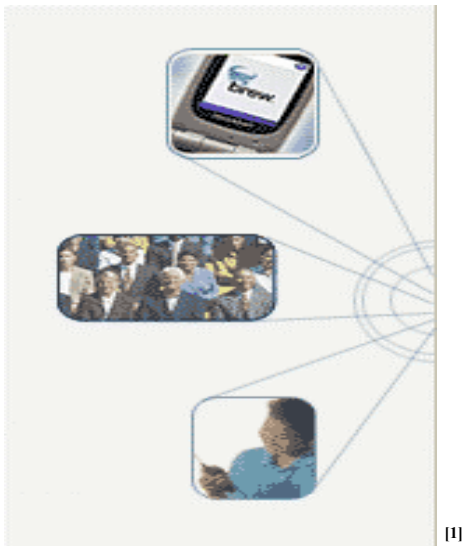


# Emerging Wireless Technologies

## *QCHAT – The Future of Push-to-Talk Communications*

*Foreword: The Public Safety Wireless Network (PSWN) Program is conducting an ongoing assessment of advancements in the wireless communications industry. The scope of this assessment is to identify emerging wireless services and technologies for potential public safety use in the near future and beyond. This article focuses on the QChat software application developed by Qualcomm Incorporated.*



As public commercial wireless networks became widespread in the 1990s, QUALCOMM was a major industry participant in the development of digital wireless communications products and services based on its code division multiple access (CDMA) digital technology. This expansion in the use of wireless networks led to the development of new products built to enhance wireless networks and to deliver advanced digital communication devices.

The QChat software application was developed by QUALCOMM's Internet Services (QIS), a division of QUALCOMM and part of the QUALCOMM Wireless and Internet group. QIS focuses on the next generation of wireless applications and services, which will combine data and voice capabilities to better suit customers' needs in a converged, wireless Internet world.

QUALCOMM developed QChat to provide a reliable method of instant connection and two-way communication between users in different locations, but operating within the same type of network architecture. Prior to the existence of cellular and personal communications services networks, this type of communication was limited to private land mobile radio (LMR) technology used by public safety and utility service agencies. LMR has limitations; specifically its usage can be restricted by geographic coverage area and by use of disparate frequency bands.

When offered by a wireless provider on its third-generation (3G) CDMA network, QChat allows two-way, push-to-talk (PTT) communications for subscribers. Currently, iDEN<sup>1</sup> is the only commercial technology that offers PTT service. QChat will expand this feature to CDMA-based commercial services.

To take advantage of QChat, subscribers must have Binary Runtime Environment for Wireless (BREW) enabled wireless telephones. QChat was developed with BREW. This article will present QChat and BREW and will give the reader insight on how the public safety community will benefit from this technology.

### **What is BREW?**

BREW is QUALCOMM's Binary Runtime Environment for Wireless applications execution platform for wireless devices. BREW is a standardized platform that can reside in many CDMA handsets,

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<sup>1</sup> iDEN - Integrated Digital Enhanced Network is a variant of Time Division Multiple Access (TDMA) developed by Motorola

from inexpensive, mass-market telephones, through high-end, multipurpose wireless devices.

Examples of BREW applications types include—

- Communications—instant messaging, e-mail, and other interactive message delivery
- Position Location—mapping, navigation, traffic awareness, and other position and location specific content
- M-Commerce—financial transactions such as account balance, point-of-purchase, stock trades.

Figure 1 depicts the BREW architecture:

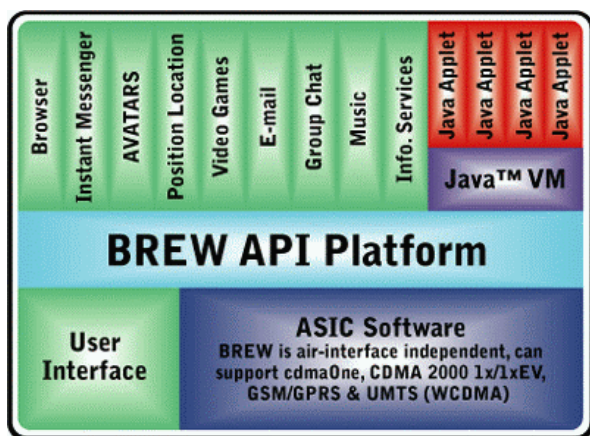


Figure 1: BREW Architecture <sup>[2]</sup>

Some advantages of using BREW include—

- Allows developers to easily write applications for wireless devices to satisfy specific requirements
- Provides a standard programming environment

- Enables rapid development of a wide variety of wireless device applications
- Gives users the ability to download applications to their wireless devices over the air via carrier networks.

Until recently, the wireless device market was closed to application developers because there was no easy way to write and integrate applications for wireless devices. Through BREW, QUALCOMM is setting the standard for a rapidly growing mass market by providing complete wireless solutions in every aspect of the industry. Through BREW, consumers can use and control applications on wireless devices, the same way they would on their desktop computers. As a result, market forces will begin driving the wireless data industry to the benefit of all the participants in that market. Figure 2 illustrates a complete BREW solution.

### What is QChat?

QChat, an application developed for the BREW platform, is a PTT communication technology for 3G CDMA networks. QChat handsets and server software allow users to connect instantaneously with other QChat 3G CDMA users anywhere in the world with the push of a button. In addition, QChat enables one-to-one (private) and one-to-many (group) calls over the 3G CDMA networks.

QChat uses standard voice-over Internet Protocol (VoIP) technologies. VoIP is a voice delivery mechanism that uses the Internet Protocol to manage the delivery of voice information. Voice information is sent in digital form over IP-based data networks (including CDMA) in discrete packets rather than traditional circuit-switched protocols such those used in the public switched telephone network (PSTN).

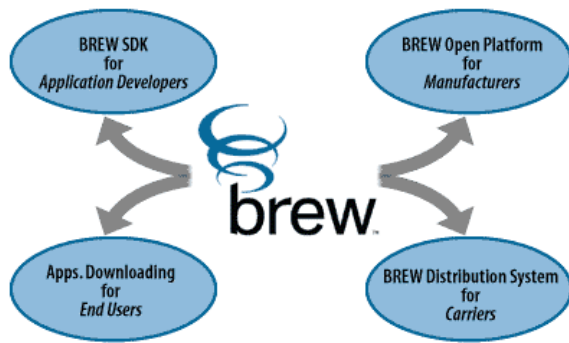


Figure 2: The Complete BREW Solution <sup>[2]</sup>

### How Does QChat Work?

QChat enables communications to begin with the press of a PTT button on the handset, rather than through completion of a standard cellular call. A call is formed by combining separate point-to-point connections between each IP endpoint at a managing entity known as the QChat Applications Server, deployed on the provider's IP-based Wide Area Network (WAN).

Pressing the PTT button originates a call to the target QChat user and provides the originator with information indicating the availability of the target user. Target users can be identified and programmed into handsets by the user or a network administrator. If the target user is available, the originator receives an immediate indication (e.g., audible tone, message on the display) and the originator can begin speaking. The call originator's voice is then sent through the carrier's network to the target's handset. Initiating a call to a QChat user who is not available simply results in a negative response tone rather than a busy signal or entry into a voicemail function.

### What Are the Advantages of QChat?

Because QChat uses VoIP architecture, subscribers using standard 3G

CDMA data networks worldwide<sup>2</sup> will be able to push a button to talk. For instance, a QChat user in Boston could make a direct push-to-talk connection with another QChat subscriber in Beijing. Currently, PTT capabilities in iDEN networks are limited to the immediate serving region. Nationwide or international PTT capabilities do not exist.

QChat enables end users to set up QChat groups dynamically from the handset without the need for action from a system administrator. Because QChat is implemented on top of BREW, consumers can choose from a wider variety of handsets from multiple handset manufacturers.

The QChat application benefits from CDMA's inherent security attributes. Since CDMA signals are digital in nature and transmitted across a wide bandwidth (as opposed to transmission over discrete frequencies), it possesses a low probability of interception and a low probability of detection, thus ensuring that transmissions are resistant to decoding and eavesdropping.

In addition, QChat offers these advantages:

- Support for over-the-air upgrade of QChat client software via the wireless download feature of the BREW platform
- Dynamic management of group membership by subscribers (i.e., the ability to add or remove participants at any time, on their handset)
- Ad hoc creation of chat groups on the handset, in addition to the standing groups that an administrator may establish

<sup>2</sup> Worldwide PTT can only be achieved if the appropriate roaming agreements are in place between the serving systems and network hardware is compatible (e.g., multiband, multimode capable)

- Easy implementation of the user interface across multiple device types and in multiple languages.

### **Development and Deployment of QChat**

In January 2002, Nextel Communications, Inc., QUALCOMM, and Motorola, Inc. announced plans to develop a Direct Connect product for global wireless network operators using CDMA platforms. Nextel has signed an agreement with QUALCOMM that complements and builds on Nextel's existing and continuing agreements with Motorola. Specifically, Nextel and QUALCOMM have entered into a licensing agreement for the further development and deployment of QUALCOMM's QChat software. Motorola will integrate the overall infrastructure solution for use in CDMA networks and will develop specific enhancements to CDMA2000 to ensure the fast call setup, mobility management, and iDEN interoperability necessary for Nextel's Direct Connect service.

In the United States, there are other commercial CDMA wireless service providers that can offer QChat to its customers. Among these service providers are Verizon and Sprint PCS. If QChat becomes available across all these service providers, the availability (e.g., coverage) of this service can possibly become greater than that of the existing iDEN PTT.

### **Other PTT Technologies and Their Relationship to QChat**

QChat is an evolutionary technology based on the PTT technologies that exist in today's communication industry – in private two-way LMR systems and some commercial wireless services such as iDEN. iDEN is currently being used as backup form of voice communications for public safety field personnel, such as emergency response and police officers. iDEN's

functionality is very similar to QChat. To be more specific, iDEN is a high-capacity digital trunked radio technology that can provide integrated voice and data services to users.

iDEN is based on TDMA technology to split a 25 kilohertz frequency into six separate time slots. Using half-duplex and full-duplex signals, iDEN is able to provide the following services:

- Cellular-like telephony
- Short Text Messaging
- Digital two-way radio, one-to-one and group, and limited dispatch capabilities
- Wireless data access.

The iDEN digital two-way radio service uses a half-duplex signal, similar to that of QChat. A normal cellular telephone call uses a full-duplex scheme (i.e., two separate channels, one to send and the other to receive) for each call.

In contrast, a Direct Connect call uses a single channel. Direct Connect relies on the proven technology of PTT, which is commonly used in dispatch-based radio systems. PTT is a simplex or half-duplex form of communications that requires the person speaking to press a button while talking and then release when they are finished. The listener then presses his or her PTT button to respond. This simplex or half-duplex access method allows the system to easily discern which direction the signal should be traveling.

### **Public Safety Uses for QChat**

Since QChat is similar to iDEN, QChat will be a very valuable addition to the public safety community's arsenal of communications methods. Many public safety officials currently use and are familiar with the operations of iDEN, and will have little trouble transitioning to QChat. QChat

will provide a new suite of enterprise communications for organizations faced with time-critical emergency situations.

## **Conclusion**

QChat's provides a PTT feature that equips users in CDMA-based networks with an easy-to-use and instantaneous communications capability. The QChat user-base is expected to be similar to that of the current iDEN systems. This user-base ranges from the general public, which simply wants the ability to communicate immediately with others across distances, to commercial users requiring a reliable means of communication between co-workers, clients, or off-site contacts. In addition, QChat technology also will provide new efficiencies to users faced with time-critical situations, including medical and emergency response personnel. According to vendors at a recent Federal Wireless Users' Forum Workshop (held in May 2002), it is anticipated that widespread implementations of QChat and similar next-generation PTT technologies will be realized within the next 2-3 years. The user communities anxiously await the coming of this exciting and versatile technology to augment their communications arsenals.

### **References:**

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