QChat™
3 key elements for a successful PTT service

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Urgent Information by Voice

Push to Chat fills a critical void in the average person’s ability to communicate urgently:

**Less Urgent**
- Government
- Industry
- Enterprise
- Consumer

**Most Urgent**
- Government
- Industry
- Enterprise
- Consumer

- 2 hours/Day
- 2-7 Minutes/Call
- 25 Seconds/Call
# Mobile Voice vs Dispatch (PTC) Service

<table>
<thead>
<tr>
<th></th>
<th>Mobile Voice</th>
<th>Dispatch Service</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Call Setup Time</strong></td>
<td>&gt; 5 s, (usually longer)</td>
<td>&lt; 3.5 s (ideally, &lt; 1 s)</td>
</tr>
<tr>
<td><strong>Who talks first?</strong></td>
<td>Call Target</td>
<td>Call Originator</td>
</tr>
<tr>
<td><strong>Call Communication Model</strong></td>
<td>Full Duplex</td>
<td>Half Duplex</td>
</tr>
<tr>
<td><strong>Mean Call Length</strong></td>
<td>~ 2 min</td>
<td>~ 25 s</td>
</tr>
<tr>
<td><strong>“Expensive” Part of Call</strong></td>
<td>Call Circuit</td>
<td>Call Setup</td>
</tr>
<tr>
<td><strong>Call Terminated by</strong></td>
<td>User Action</td>
<td>Iactivity (or User Action)</td>
</tr>
</tbody>
</table>
PTC Technology: Key 3 Elements
3 Key Elements for broad PTC Success

1. The service must provide highly interactive low-latency communication.

2. The service must provide predictable and reliable feedback to users.

3. The service must scale efficiently.
PTC Technology – Timing Performance

1. Low Latency
Latency has 4 key components

<table>
<thead>
<tr>
<th>Timing Performance Metric</th>
<th>Ideal Range</th>
<th>Acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial PTT Latency</strong> - time between the originating user’s first press of PTT to start a call and the feedback tone indicating the originating user may speak</td>
<td>&lt; 1.5 s</td>
<td>&lt; 3.5 s</td>
</tr>
<tr>
<td><strong>Initial Media Latency</strong> - time required for the originator’s speech to travel from the originating handset to the target handset (first talk-spurt in a call)</td>
<td>&lt; 1.0 s</td>
<td>&lt; 4.0 s</td>
</tr>
<tr>
<td><strong>In Call PTT Latency</strong> - time between the user’s press of PTT and the feedback tone granting the user permission to speak (subsequent talk-spurts in a call)</td>
<td>&lt; 500 ms</td>
<td>&lt; 800 ms</td>
</tr>
<tr>
<td><strong>In Call Media Latency</strong> - time required for talker’s speech to travel from talker’s handset to listener’s handset (subsequent talk-spurts in a call)</td>
<td>&lt; 650 ms</td>
<td>&lt; 800 ms</td>
</tr>
</tbody>
</table>

1. Low Latency
PTC End User Latency MOS

1. Low Latency

Ref: Public OMA User Study PoC 2003
QChat Technology – The Fastest PTC on CDMA

QChat meets or exceeds all key timing performance metrics for a PTC service, while remaining scalable, efficient, and providing reliable feedback.

<table>
<thead>
<tr>
<th>Timing Performance Metric</th>
<th>Ideal Range</th>
<th>QChat EV-DO+ (GTP)</th>
<th>QChat 1X-A (GTP)</th>
<th>BREWChat 1X-0 (OTP)</th>
<th>Acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PTT Latency (dormant to dormant)</td>
<td>&lt; 1.5 s</td>
<td>&lt; 1.0 s</td>
<td>&lt; 1.6 s</td>
<td>&lt; 3.2 s</td>
<td>&lt; 3.5 s</td>
</tr>
<tr>
<td>Initial Media Latency (dormant to dormant)</td>
<td>&lt; 1.0 s</td>
<td>&lt; 1.0 s</td>
<td>&lt; 2.0 s</td>
<td>&lt; 4.0 s</td>
<td>&lt; 4.0 s</td>
</tr>
<tr>
<td>In Call PTT Latency</td>
<td>&lt; 500 ms</td>
<td>&lt; 500 ms</td>
<td>&lt; 500 ms</td>
<td>&lt; 600 ms</td>
<td>&lt; 800 ms</td>
</tr>
<tr>
<td>In Call Media Latency</td>
<td>&lt; 700 ms</td>
<td>&lt; 550 ms</td>
<td>&lt; 700 ms</td>
<td>&lt; 800 ms</td>
<td>&lt; 800 ms</td>
</tr>
</tbody>
</table>

1. Low Latency

Disclaimer: These numbers represent calculated averages on optimized networks
PTC Technology – 2. Predictable and Reliable Feedback

The user’s impression of the predictability and reliability a PTC service is determined primarily by the meaning associated with the floor-grant tone:

- **Guaranteed Talk Permit (GTP)** – A floor-grant which implies that the target of the call is confirmed to be available, usually achieved by contacting the target before granting the floor. The talk-spurt is certain to be delivered to the target.

- **Optimistic Talk Permit (OTP)** – A floor-grant which suggests that the target of the call is likely to be available. The talk-spurt may not ultimately be delivered to the target.

- **False Positive** – A condition allowed by OTP, in which the originator of a call is allowed to speak but the target ultimately proves not to be available. The talk-spurt is lost. The originator may or may not be notified of the error.
2. Predictable and Reliable Feedback
PTC Technology – Optimistic Talk Permit

2. Predictable and Reliable Feedback
PTC Technology – Optimistic Talk Permit (False Positive)

2. Predictable and Reliable Feedback
PTC Technology – 3. Efficiency and Scalability

• In order to provide the best ARPU results, the service must be capable of being deployed ubiquitously, to all subscribers of the wireless operator.
  – Network Utility = (Users)^2  
    Ref: Metcalf’s Law
    • Radio – 10 years to critical mass
    • PCs – 7 years to critical mass
    • WWW – 3 years to critical mass
  – Application Layer PTC will distribute easily
  – Low cost design matters now
  – Technology partners are a must

• The service should interoperate with other PTC services.
  – PTC service revolves around communities.
  – SIP–based protocols, such as PoC are important
Delivering QChat Calls on CDMA is very Low Cost

<table>
<thead>
<tr>
<th>Technology</th>
<th>Network Cost per M byte**</th>
<th>Network Cost per QChat Call***</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPRS</td>
<td>$.415</td>
<td>$.02</td>
</tr>
<tr>
<td>WCDMA</td>
<td>$.069</td>
<td>$.0042</td>
</tr>
<tr>
<td>CDMA2000 1X 0, A</td>
<td>$.059</td>
<td>$.004</td>
</tr>
<tr>
<td><strong>CDMA2000 1xEV-DO</strong></td>
<td><strong>$.02</strong></td>
<td><strong>$.0012</strong></td>
</tr>
</tbody>
</table>

Model Assumes capacity vs. coverage conditions
GPRS max 20kbps, rate achieved per time slot
**15% traffic volumes at busy hour
***99% PTC call traffic carried on the carrier WAN
***Assumes 30,000 bytes/ mobile/call X 2 mobiles/call

3. Efficiency and Scalability
Address Book Traffic Channel Activation

Traffic channels should never activate by navigating the address book. Doing this will make the data call set-up time seem twice as fast, but could double the average call’s cost!

QChat and BREWChat do not do this.

3. Efficiency and Scalability
Standards and Performance are Key

• Qualcomm and Nextel are participating in OMA for Server-Server Interoperability

• Interoperability between QChat and PoC is essentially the same issue as interoperability between PoC clients

• QChat/BREWChat Technologies are based on several open standards:
BREW Enables:
• Market Seeding
• OTA Client Upgrades
• Extension to Apps
• Client-Client Interop

QChat Enables:
• Quick Call Set-ups
• Media Transparency
• SIP Connectivity
• Push-to-Anything
# BREWChat/QChat Capable Handsets

## Committed Handsets

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curitel</td>
<td>CX-839</td>
<td>Trial Handset</td>
</tr>
<tr>
<td>Kyocera</td>
<td>Kx444 (K7 PTT)</td>
<td></td>
</tr>
<tr>
<td>Kyocera</td>
<td>S3 PTT (3250)</td>
<td>Slider Soft Key</td>
</tr>
<tr>
<td>Kyocera</td>
<td>KZ-850 RUIM</td>
<td></td>
</tr>
<tr>
<td>Kyocera</td>
<td>K10 PTT “Viper”</td>
<td>QChat Handset</td>
</tr>
</tbody>
</table>
QChat Strategic Relationships Help the Carrier to Connect