

Delivering on the Promise of 3G Wireless

*Making **Wireless** — Making **3G***

Viewpoints often differ when contemplating the required elements for 3G success, raising questions about which of the numerous standards and varying flavors will succeed to deliver true 3G capabilities. Yet despite the differing opinions, one point is clear: 3G is taking off, driven in large part by the exciting applications and services being made available to consumers.

Web surfing, high-resolution digital photography and MP3 service on the wireless handset are already mainstream. Sophisticated multimedia-enabled handsets that can serve as digital video camcorders or offer high resolution digital television broadcasts are emerging in some areas of the world today. The possibilities are endless as more 3G handsets are sold and more exciting multimedia applications are made available to truly transform the handset into an essential mobile entertainment device and productivity-boosting tool. These exciting new services will be the driving force in accelerating 3G uptake, driving increased average revenue per user (ARPU) for mobile operators and creating opportunity for every part of the wireless value chain.

Texas Instruments, the leading wireless semiconductor supplier, is making 3G wireless a reality. With more than 15 years of wireless communications systems expertise, TI is committed to making 3G a high-growth, high-revenue opportunity. At the center of TI's 3G capabilities are OMAP™ processors and digital baseband processors already widely adopted and proven in 2.5G mobile phones. OMAP processors deliver multimedia application processing capabilities that are at the core of true 3G services that will drive this market. In addition to applications, there are many factors essential to delivering on the promise of 3G—openness, flexibility, seamless connectivity, global reach and reliable service. With TI's industry experience, leading application and wireless communication technology solutions and collaborative customer-focused approach, TI is already leading the way to 3G. Texas Instruments is Making 3G.



Leveraging TI's proven, global GSM footprint as a foundation for 3G UMTS

*TI supplies 3G processors to 6 of the top 7 worldwide 3G handset manufacturers.**

OMAP™ platform for essential 3G multimedia applications and services

According to IDC, TI's applications processors garnered two-thirds of the rapidly growing market for wireless applications processors.

TI's global footprint and proven experience on all GSM-based networks worldwide, along with core competencies in consumer electronics and broadband, have already extended naturally to the growing 3G UMTS market. Through its more than 15 years of wireless communications systems know-how, TI established a broad wireless technology portfolio that has made it the leading provider of wireless semiconductor solutions. In fact, nearly 1.8 billion handsets have shipped to date based on a TI digital baseband.

As the marketplace evolves to 3G UMTS, the high-throughput enhancement to the industry-leading GSM standard, TI continues to offer choices to customers and maximum reuse of engineering resources in developing 3G solutions. UMTS, the universal 3G technology that has been standardized by 3GPP (Third Generation Partnership Project), includes GSM/GPRS/ EDGE combined with a WCDMA air interface, thus enabling global roaming for the majority of handset users. These characteristics helped establish GSM as the world's leading universal standard with over one billion subscribers and approximately two-thirds of the worldwide digital wireless market.

As the market evolves to 3G UMTS, Texas Instruments customers who are invested in GSM-based standards today, can maintain their technology investments, leverage the natural progression to UMTS and maximize software and hardware reuse.

Leading handset makers and operators worldwide have come to recognize the strengths of TI's OMAP application and communications processors in delivering the performance and power efficiency necessary to run the most advanced multimedia features. These customers also value the OMAP processors' open and flexible software environment for delivering truly unique application packages.

With its second generation OMAP 2 architecture, specifically designed for the multimedia-intensive demands of 3G, TI is redefining the mobile entertainment experience. By combining consumer electronics-quality applications and communications processing into the small footprint of a mobile handset, TI is delivering mobile entertainment and on-the-go productivity essential to make 3G take off.

Additionally, because of the power-efficient, high performance of the OMAP processors, all of these exciting new features can be delivered while meeting users' expectations and quality of service standards that are key to accelerating 3G adoption and driving increased ARPU. OMAP processors provide usage experiences critical to 3G that have

**Manufacturers as ranked by Yankee Group, 2Q 2004*

OMAP processors are in 5 of 5 of the phones on DoCoMo's FOMA network, the first and most advanced 3G network in the world.

Open, flexible solutions and standards for 3G requirements

not been as important in prior generations of wireless technology, including system responsiveness and multimedia quality for pictures, video and audio. These quality-of-service needs and expectations will only continue to increase, and by design, OMAP processors will provide the ultimate 3G user experience.

Seamless mobile connectivity and communications with global roaming and interoperability are necessary components for true 3G implementation—it is these qualities that deliver the broader service, expanded range and roaming abilities demanded by consumers. Global access and cost-effective, high-quality service, regardless of the user's location, are essential to accelerate the 3G rollout. Truly universal 3G wireless coverage requires that the market embrace open, flexible standards that deliver interoperability anywhere, anytime.

TI's goal is to offer handset manufacturers choices within a marketplace driven by open standards. These choices allow manufacturers to differentiate themselves and offer a wide array of handset models with unique features to meet a variety of consumer and enterprise market segments. To provide its customers with choices, TI takes an open approach to the market and customer relationships, offering a modular wireless portfolio that includes multiple combinations of digital basebands, applications processors and connectivity technologies to give customers maximum design flexibility and innovation options.

NTT DoCoMo selected TI for joint development of an integrated 3G UMTS baseband and applications processor, based on TI's OMAP 2 architecture.

TI actively participates in industry alliances and standards bodies, including OMA, MIPI Alliance, Wi-Fi Alliance, 3GPP, IEEE 802.11 (Wireless LAN), 802.15 (*Bluetooth*[®] wireless technology and UltraWideband), 802.16 (WiMAX) and others. These organizations share a common goal of open development to accelerate global deployment of wireless applications and services. This participation helps ensure that TI's solutions are open, flexible and designed for compliance with common industry standards so customers can get to market in the shortest time possible.

Additionally, support of open, flexible standards gives TI customers the ability to reuse their technology investments as mobile capabilities and services evolve. Because of TI's commitment to support open standards and to deliver flexible solutions, companies that work with TI can get to market quickly with truly differentiated product offerings.

UMTS—The universal 3G standard

The original intent behind 3G was to evolve the core GSM network and supporting cellular wireless technologies to an open standard. This vision led to the formation of the 3rd Generation Partnership Project (3GPP) that is very active and embraced by many in the industry. The definition of 3G developed by 3GPP serves as the basis for 3G UMTS that TI strongly supports today.

3G UMTS is a high-throughput enhancement to the GSM standard and includes GSM/GPRS/EDGE along with WCDMA radio access technology. The GSM/GPRS/EDGE element is critical for meeting the 3G requirements for universal interoperability and connectivity. Today, UMTS phones roam in the U.S., Europe, and Japan, and because UMTS inherently includes support for GSM/GPRS/EDGE. UMTS phones will also roam in most other parts of the world (China, Russia, the Middle East, etc.).

Some refer to 3G as WCDMA (UMTS), which can be confusing for several reasons. The WCDMA reference may infer to some that WCDMA is CDMA with enhancements. This is not the case. While WCDMA and CDMA both include Code Division Multiple Access (CDMA) technology, they are two unique standards that are implemented differently. For this reason the two are neither interoperable nor compatible, and they do not interact with base stations in the same way. The features of each standard are unique and were developed by different standard bodies.

It is important to note that WCDMA is only one element of true 3G technology. UMTS, the universal standard, includes GSM, GPRS and EDGE, as well as WCDMA, to provide essential capabilities that meet key 3G requirements.

Extending wireless expertise through work with industry leaders, 3G pioneers

Today TI supplies 3G processors to leading manufacturers in the United States, Europe, Korea and Japan. Additionally, TI has collaborated with a number of operators on several fronts. TI was selected by 3G pioneer NTT DoCoMo as a multimedia development partner for deploying their commercial 3G network. That relationship now includes development of an integrated 3G UMTS baseband and applications processor, based on TI's OMAP 2 architecture, that will be offered to device makers worldwide. TI OMAP applications processors are already in the majority of phones on DoCoMo's 3G FOMA network—the world's first and most advanced commercial 3G network.

In addition, the deep-rooted relationships TI maintains with industry leaders are based on a collaborative, customer-focused approach. TI's extensive experience in GSM and broad wireless technology portfolio allows these customers to leverage past technology investments and make a seamless, cost-effective transition to 3G and beyond—across standards and regions.

*Process technology,
manufacturing
strength furthers TI
innovation in 3G*

TI maintains close links between product design and manufacturing to deliver the most advanced and integrated solutions to customers quickly and cost-effectively. Continued advancements in process technology and high volume manufacturing give TI the ability to tightly integrate the added functionality that works to run advanced applications, enable small and sleek form factors, extend battery life and reduce costs. This technology innovation continues to drive industry firsts, including the single-chip cell phone that will be based on TI's unique Digital Radio Processing (DRP) architecture and will leverage TI's integration expertise.

*Broad wireless
technology portfolio
for seamless mobile
connectivity*

In addition to offering 3G cellular technology, TI is accelerating the mobile connectivity revolution in handsets to change the way people use their cell phones—enabling seamless connections across multiple wireless networks and technologies. TI offers the broadest portfolio of mobile connectivity technologies in the industry, including WLAN, Bluetooth® wireless technology, A-GPS, UWB, RFID and Digital TV. These technology offerings, coupled with deep cellular systems expertise, enable TI to deliver the most flexible solutions optimized specifically to meet the demands of the handset environment and offer innovative voice and data connectivity options for consumers and the enterprise.

*Texas Instruments—
Making 3G*

With deep industry experience, leading OMAP application and wireless communication processors and a collaborative customer-focused approach, TI is the best choice for wireless technology solutions in 3G and beyond.

Important Notice: The products and services of Texas Instruments Incorporated and its subsidiaries described herein are sold subject to TI's standard terms and conditions of sale. Customers are advised to obtain the most current and complete information about TI products and services before placing orders. TI assumes no liability for applications assistance, customer's applications or product designs, software performance, or infringement of patents. The publication of information regarding any other company's products or services does not constitute TI's approval, warranty or endorsement thereof.

OMAP is a trademark of Texas Instruments. The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc., and any use of such marks by Texas Instruments is under license. All other trademarks are the property of their respective owners.