TI Delivers New DSP and Analog Products Targeting 3G Wireless Base Stations
Trends in Rollouts of 3G Networks

Europe and Russia
- Western Europe – 2005 will see growth in 3G phone availability and subscribers
- Eastern Europe – Strong emerging market with interest in 3G
- Russia – Passed 50% penetration in 2004; growth will continue

Japan
- DoCoMo initiated coalition for Super3G will drive next gen networks

North America
- 2004 mergers will spur 3G deployments in 2005
- Data intensive applications will drive growth

China and Asia
- China 3G licenses delayed to mid-2005
- South Korea looks to WIBRO
- India expected to double within two years
- Indonesia will see significant growth

Worldwide
- Multiple air interfaces and data intensive applications will drive growth in 3G wireless infrastructure market
New Universal Baseband DSP Supports Multiple Air Interfaces and Base Station Form Factors

From Network to Antenna, Complete Signal Chain Solution Benefits Base Station OEMs
New 1 GHz TMS320TCI6482 DSP Delivers the Right Performance, Power and Enablers

High Performance at 1 GHz
- OEMs can add more users and services per processor

Low Power at 3 Watts
- OEMs can add more processors per board and more boards per rack

Industry Specific Enablers
- OEMs can use the same device in multiple standards
TI’s Industry Specific Enablers Maximize 3G Wireless Performance and Services

Industry Specific Enablers

- 28 New Wireless Infrastructure Instructions
- Rake, RACH, Search, Spread Assist (RSA)
- Enhanced Vertibi and Turbo Co-processors

Wireless voice coding
- Channels of 12.2 kbps AMR Voice
  - VCP Boost:
    - C6203 at 300 MHz: 74
    - C6414/15 at 600 MHz: 134
    - TCI6482 at 1 GHz: 763
  - ~1.8X
  - ~3.7X

Wireless data coding
- Channels of 384 kbps data
  - TCP Boost:
    - C6203 at 300 MHz: 0.9
    - C6414/15 at 600 MHz: 2
    - TCI6482 at 1 GHz: 44
  - ~2X
  - ~22X

WI Instruction Set Performance Lift
- ~30%

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**Universal Baseband Supports Multiple 3G Standards and Base Station Form Factors**

<table>
<thead>
<tr>
<th>Universal Baseband Modem Implementation for Multiple Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UMTS Small Form Factor Modem</strong></td>
</tr>
<tr>
<td>UMTS, TD-SCDMA, WiMAX, cdma2K</td>
</tr>
<tr>
<td><strong>TD-SCDMA Modem</strong></td>
</tr>
<tr>
<td><strong>UMTS RACH processing</strong></td>
</tr>
<tr>
<td>No ASIC Required</td>
</tr>
<tr>
<td><strong>WiMAX Modem</strong></td>
</tr>
<tr>
<td><strong>UMTS Macro BTS – TX Chip Rate</strong></td>
</tr>
<tr>
<td>Supports Small Form Factor to Macro</td>
</tr>
<tr>
<td><strong>Cdma2000 Modem</strong></td>
</tr>
<tr>
<td><strong>UMTS Symbol Rate Solution</strong></td>
</tr>
<tr>
<td>Supports various Radio Topologies</td>
</tr>
<tr>
<td><strong>GSM/EDGE Modem</strong></td>
</tr>
<tr>
<td><strong>UMTS Macro BTS Modem</strong></td>
</tr>
<tr>
<td>Variety of Voice &amp; Data Mix supported</td>
</tr>
</tbody>
</table>

UMTS Release 5, TD-SCDMA Release 4, WiMAX (802.16e), cdma2000 Release D
OEMs Can Add More Users and Services Per Processor

**High Performance**

- **Memory**
  - 16 KB Boot ROM
  - 32 KB L1 Prog. memory
  - 32 KB L1 Data memory
  - 2 MB L2 Local memory

- **Communications Subsystem**
  - 1x/4x SRIO
  - Gigabit Ethernet RGMII
  - UTOPIA II
  - DDR2-533 (32-bit EMIF)
  - 64-bit EMIF (SDR)
  - HPI, PCI-66MHz
  - I²C

**More Services**

- **Wi-MAX**
  - Video streamed to mobile terminal @ 20 Mbits per second

- **HSDPA**
  - Mobile Internet on a cell phone: Improves the user experience to between 3 – 14 Mbits
  - Streaming video applications: 10X performance increase for video conferencing and gaming
TI DSP Solutions Enable Customers to Meet Design Goals

Unmatched Systems Expertise for Customer-Driven Solutions

- Dedicated business unit integrated across product lines
- Cross-signal chain expertise spawns innovation

High Performance Enables Capability to Add New Services

- Higher channel density and flexibility to allow more features
- First to deliver 90nm technology

Reduced Development Costs

- Robust roadmap delivers backwards compatibility
- Ultimate programmability future proofs solutions
Universal Baseband Meets Needs for 3G In-Building Applications

- Carriers want to improve coverage in campus environments, elevators, basements, etc.
- New base station form factors for 3G will begin to emerge – pico, micro, small form
- TCI6482 delivers high performance with very low power to address in-building environments

ABI Research 2004

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TI Adds Industry Leading Data Converter and Power Amplifier Processor
DAC5687: 16-Bit, 500-MSPS Dual-Channel Digital-to-Analog Converter Targets 3G Wireless Base Stations

- 500-MSPS supports multiple standards plus popular 3G clock rates
- Highly integrated configurable features including gain, phase and offset control for direct up conversion architectures
- Reduces component counts and manufacturing costs
- Overall end-to-end, low noise solution reduces cost of power amplifier
Robust Family of DACs Supports Wide Range of Wireless Infrastructure Systems

<table>
<thead>
<tr>
<th>DACs with digital processing</th>
<th>Resolution (Bits)</th>
<th># of Channels</th>
<th>Supply (V)</th>
<th>Update Rate (MSPS)</th>
<th>WCDMA ACLR (dBc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAC5687</td>
<td>16</td>
<td>2</td>
<td>3.3/1.8</td>
<td>500</td>
<td>81</td>
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<td>DAC5686</td>
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<td>2</td>
<td>3.3/1.8</td>
<td>500</td>
<td>76</td>
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<td>DAC5674</td>
<td>14</td>
<td>1</td>
<td>3.3/1.8</td>
<td>400</td>
<td>69</td>
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<tbody>
<tr>
<td>DAC5672/62/52</td>
<td>14/12/10</td>
<td>2</td>
<td>3.0-3.6</td>
<td>200</td>
<td>73</td>
</tr>
<tr>
<td>DAC2904/2/0</td>
<td>14/12/10</td>
<td>2</td>
<td>3.0-5.0</td>
<td>125</td>
<td>68</td>
</tr>
<tr>
<td>DAC904/2/0</td>
<td>14/12/10</td>
<td>1</td>
<td>3.0-5.0</td>
<td>165</td>
<td>65</td>
</tr>
</tbody>
</table>

• Increased update rate (MSPS) allows wider bandwidth, enabling more users per radio card

• State of the art ACLR exceeds critical 3G multi-carrier demands (increase users/radio)

• Flexible portfolio allows OEM to optimize solution for their market/system configuration

*note
TM1 ACLR @ 30.72MHz
GC1115: Crest Factor Reduction Processor Cuts Wireless Base Station Costs

- Significantly increases efficiency of base station power amplifiers providing substantial cost savings
- Limits signal peaks, driving down peak-to-average ratio (PAR)
- Flexible solution can be programmed for variety of carrier configurations (3GPP UMTS, 3GPP2 CDMA2000)

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End to End Direct Up Conversion Architecture for 3G Transmit Delivers Low Cost

- Direct up conversion architecture – cost effective, minimizing RF component count
- Low noise DAC5687 reduces RF requirements and reduces load on the power amplifier
- Enables transition from 1 carrier to 4 carriers
Complete Signal Chain Solution Delivers Multiple Benefits

- **Handset/Consumer**: Access to new compelling services
- **Service Provider/Carrier**: Investment protection and increased revenue from new services
- **Base Station OEM**: Development cost and time savings