



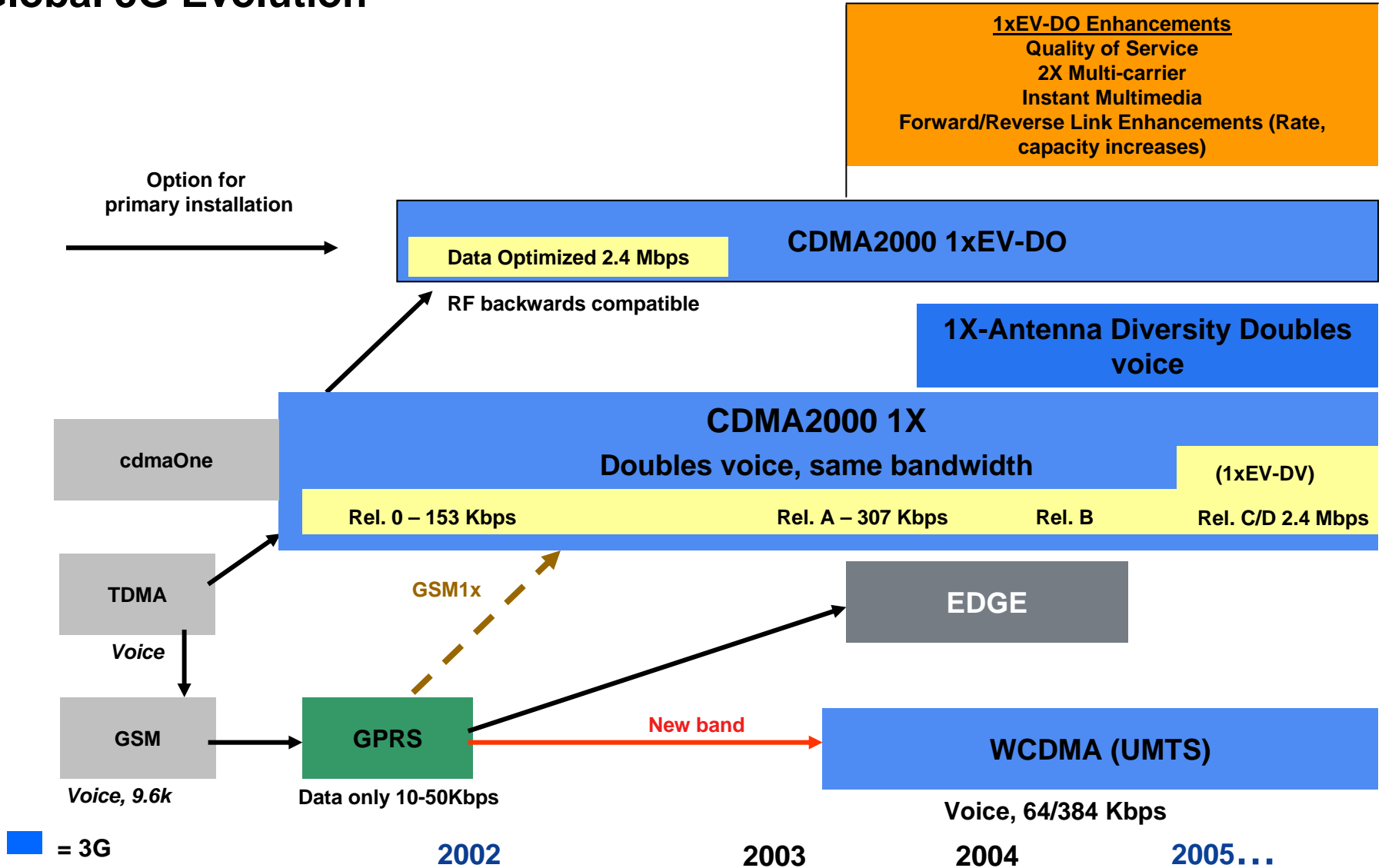
Agenda

- Qualcomm CDMA Technologies (QCT)
 - **CDMA Markets**
- RF/Analog design group
- Cell phone markets
- Technology focus
 - **RFCMOS**
 - **SiGe**
- Key circuit blocks
- Q&A

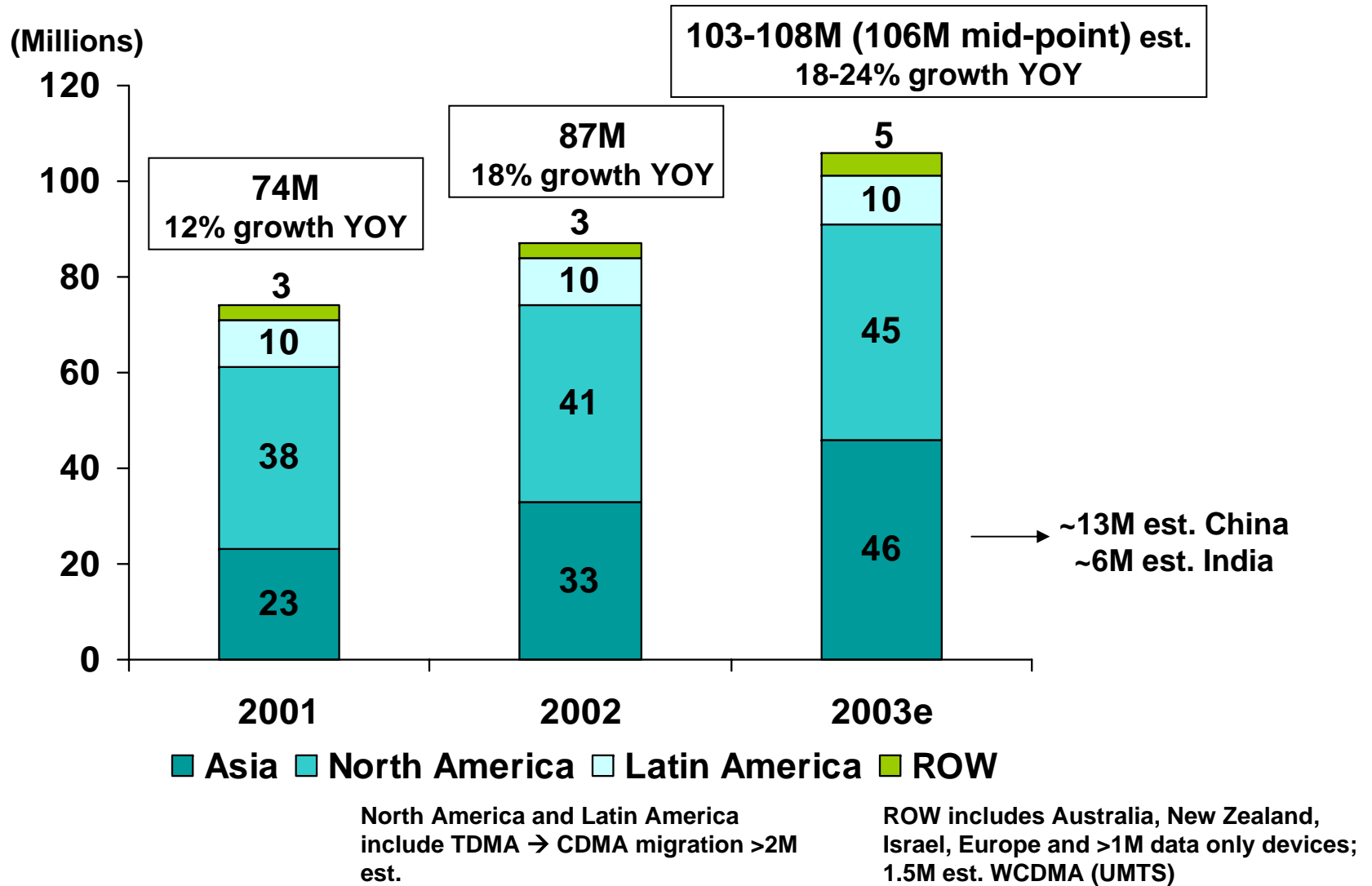
Qualcomm Overview

- Qualcomm Incorporated
 - **\$52 Billion Company**
 - **Founded by Dr. Irwin Jacobs and Dr. Andrew Viterbi**
 - **Developed CDMA (Code Division Multiple Access) standard for Cell phones.**
- Qualcomm CDMA Technologies
 - **Division of Qualcomm which develops the complete system solution for multi mode handsets.**
 - **Largest Fab less Semiconductor supplier**
 - **QCT disciplines**
 - Communication System Design
 - Digital Signal Processing
 - VLSI Design
 - RF/Analog Circuit design
 - RF system design
 - Phone and System Software
 - Reference design and verification
 - Analog and Digital IC test development

Global 3G Evolution



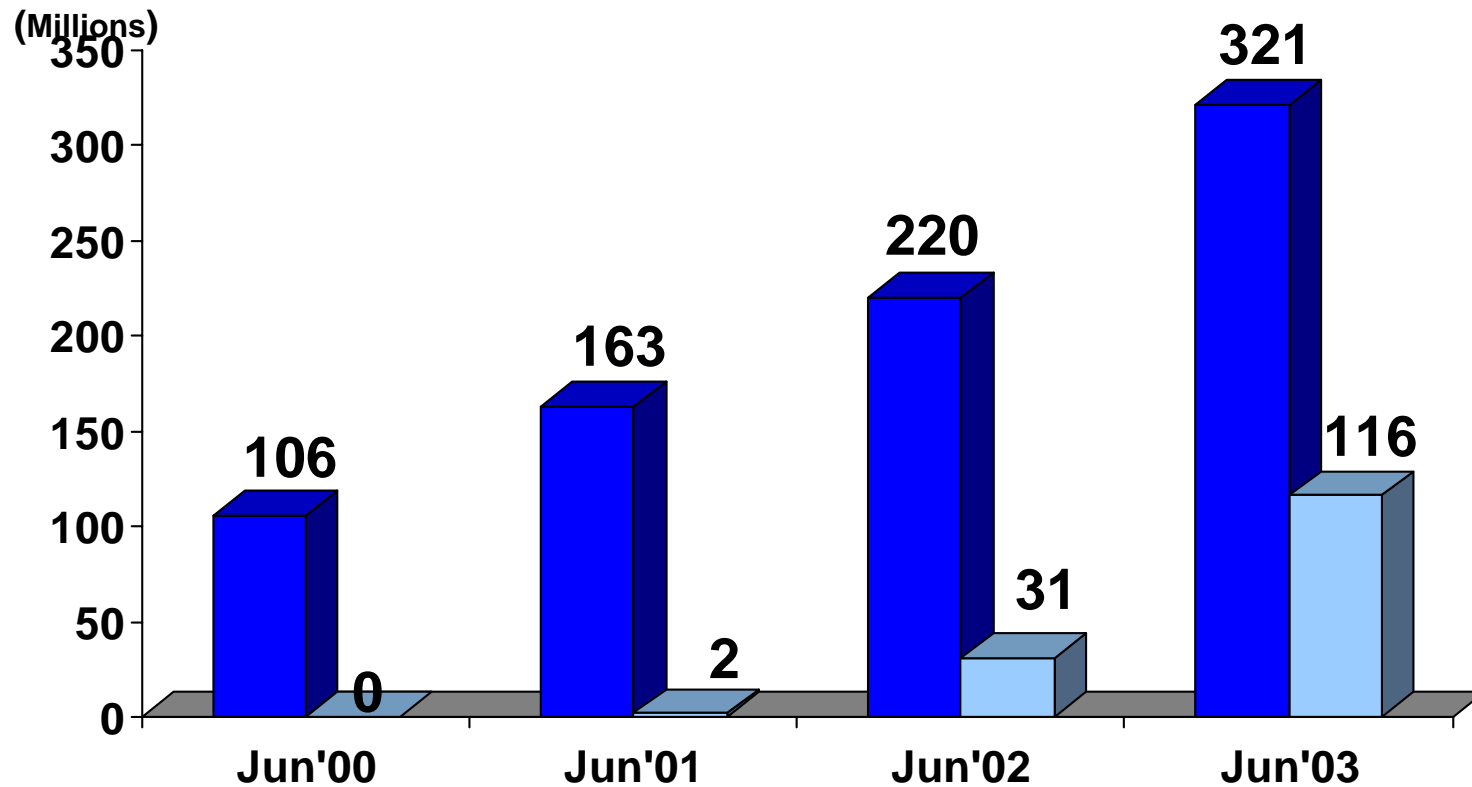
Regional CDMA Handset Estimate



QCT – Leading the Industry in CDMA Over 1 Billion Total Chips Shipped Since 1994

- First complete solution in the semiconductor industry
- Full RF, power management, baseband (MSM), and software

■ Total MSMs ■ 3G MSMs (CDMA2000 1X & 1xEV-DO)



QCT RF analog Group

- Design state of the art multi band and multi mode receiver, transmitter, transceiver, power management and mixed signal integrated circuits that interface with QCT's base band solution.
- Design in both SiGe and CMOS
- Design of all analog and mixed signal functions that are required in a cell phone.
 - **Codecs, Power management, A/D and D/A converters. Etc**
- 49 RF/Analog IC Designers
 - **331 Years of RF/Analog IC design experience.**
 - **51 % have a MS or ME**
 - **37% PHD**

RFIC Long Term Product Plan Objectives

- Provide RFIC Product Plan that addresses product innovation and evolution coupled with silicon process technology driven by:
 - **System Level Cost**
 - **Power Consumption**
 - **Integration**
 - **Minimize the number of die to support the market segmentation**

Challenging Circuits required for Multi mode CDMA handsets

- CMOS VCO for PCS CDMA 1x mode.
 - Requires phase noise of -139 dBc/Hz at 1.25 MHz offset
 - Wide tuning to meet Global handset requirements
 - 1740 to 2180 MHz , KPCS to IMT band.
 - Extend tuning range further to include cell band followed by a divide by 2 circuit.
- CMOS LNA's with providing excellent cross modulation performance and low noise figure.
- High efficiency Power Amplifiers for non-constant envelop modulation schemes.
 - Polar Transmit architecture for multi mode phones.
- High IIP2/IIP3 CMOS mixers
 - Auto Calibration techniques to improve IIP2.
 - Allows one to eliminate inter stage RF saw filter

Employment opportunities at Qualcomm

- Qualcomm hires the most qualified people.
- RF and Analog mixed signal design positions are available at Qualcomm.
- Year round Internships also available.
- Please send email to ksahota@qualcomm.com