Product Bulletin

IP Phone Solutions TNETV1051/1052/1053

Key Features

- Leading edge TI DSP technology that allows:
  - Multi-way conferencing
  - Advanced acoustic echo cancellation
  - Advanced compression algorithms
- Field-proven Telogy Software for VoIP with enhanced Quality of Service, extensive interoperability and remote monitoring
- Expandable solution for next-generation IP phone applications
- Gigabit Ethernet throughput to PC and LAN
- Pre-integrated RTOS for rapid implementation of value-added features and services
- PIQUA™ IP quality management elements
- Strong, hardware-accelerated security framework (AES, DES/3DES, SHA1/MD5, PKA, RNG)
- Static packet filter for protection against Denial of Service attacks
- Largest worldwide installed base of IP phone solutions
- World-class technical support

The TNETV1051, TNETV1052 and TNETV1053 IP phone processors are integrated platforms featuring Texas Instruments' (TI's) market-leading programmable TMS320C55x™ Digital Signal Processor (DSP), a 300-MHz MIPS processor and field-proven Telogy Software™ for VoIP.

TI's newest IP phone solutions leverage TI's investment in communication processors for VoIP to provide superior processing horsepower for current and evolving IP phone standards. In addition, advanced capabilities such as support of Gigabit Ethernet enhance the functionality of these solutions.

A starter kit is available, which includes a software development license, software training and a complete IP phone reference design so that development can begin immediately

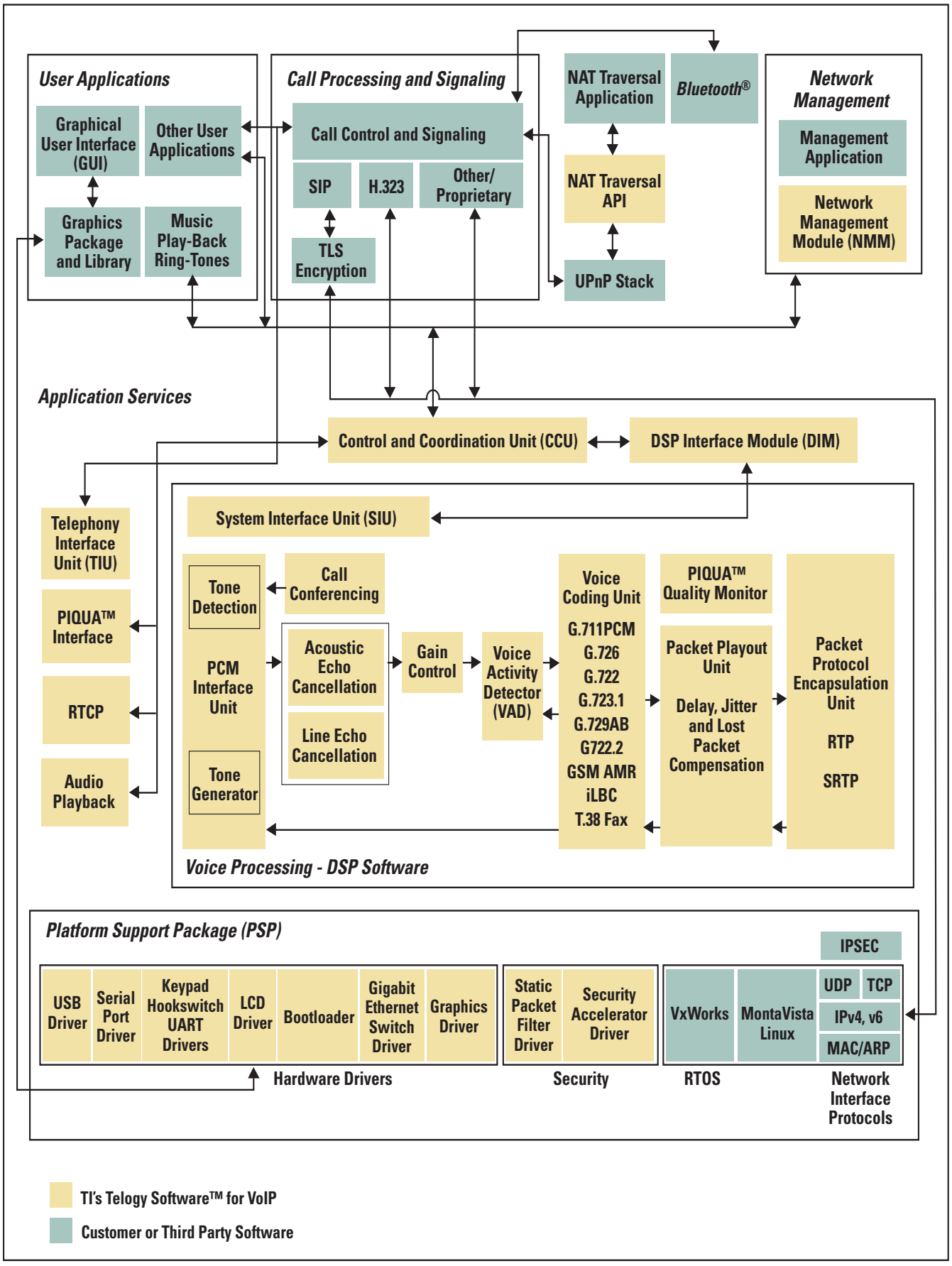
Telogy Software for IP Phone Applications

The pre-integrated and rigorously tested Telogy Software is an efficient framework for real-time voice processing. The complete DSP feature set includes PCM reception, tone generation, acoustic echo cancellation, voice activity detection, voice playout and a variety of voice compression options. Telogy Software is provided in several packages to simplify the customization of a full line of IP phones.

Telogy Software as well as third-party software for the general purpose MIPS processor core comprises a toolkit with a variety of functions for IP phone implementations. This toolkit includes the voice services that run on the DSP as well as an easy-to-use application programming interface (API) for quickly implementing call processing features. Sample code for device drivers and network management is also provided. The industry-leading security framework is based on hardware accelerators that eliminate possible latencies, ensuring transparency to users. The Security Accelerator engine speeds processing of a variety of security algorithms. These include AES, DES, and 3DES encryption, SHA1 and MD5 authentication, Public Key Acceleration (PKA), and Random Number Generation (RNG). In addition, the TNETV1051/1052/1053 devices feature a static packet filter for protection against Denial-of-Service (DoS) attacks.

TI's newest IP phone solutions feature advanced functionality for today's executive speaker-phones. The devices' acoustic echo cancellation supports full

TNETV1051 IP Phone Software Architecture



duplex speakerphone capability when they are deployed in a properly designed enclosure. Moreover, the chips support six-way conferencing as well as a variety of advanced low bit rate and wideband codecs.

Silicon Solutions

The TNETV1051/1052/1053 chips include a programmable TI C55x™ DSP for optimal VoIP and signal processing. The MIPS32 24KEc processor is a standards-based RISC core that simplifies the development of new features and their integration with Telogy Software. Two 10/100/Gigabit Ethernet media access controllers (MAC) support a high-speed and flexible switching mechanism that connects the IP phone to PCs and/or a local area network (LAN) via three Gigabit Ethernet ports. The TNETV1051 family also features two 10/100 Ethernet PHYs, enabling developers to design a cost effective phone when gigabit technology is not required.

The devices have a USB 1.1 controller and physical layer interface (PHY) for either USB host or peripheral functionality. A wide variety of peripheral devices can be connected to the IP phone by way of the USB interface. Applications such as card readers, fingerprint recognition, PDA synchronization, video conferencing and others can utilize the USB port.

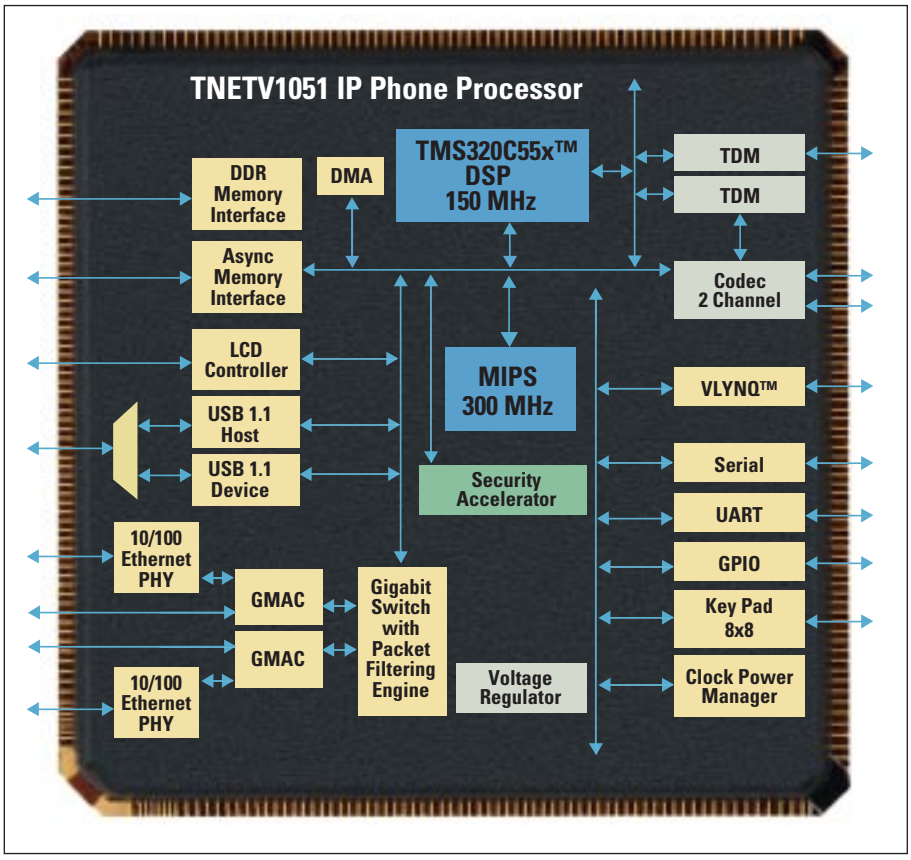
TI's VLYNQ™, a low cost, low pin count and low complexity chip-to-chip serial interface, is also included on the TNETV1051/1052/1053 devices, simplifying the integration of co-processors or other peripheral capabilities. A number of value-added features such as video/multimedia, wireless connectivity, security, speech recognition and others can be quickly implemented through the VLYNQ interface.

PIQUA Quality Management

The TNETV1051 family of IP phone processors is equipped with TI's PIQUA quality management technology. With PIQUA's local quality management elements embedded into IP phones, service providers are able for the first time to monitor the quality of the voice, video and data service experienced by subscribers on IP networks. Because of the enhanced visibility service providers have into the operation of their networks, they are able to isolate faults and service degradations. In addition, TI's PIQUA technology can initiate real-time mitigation techniques to maintain a high level of quality service, ensuring satisfied subscribers.

Description

The TNETV1051/1052/1053 devices are dual-core communications processors based on a MIPS 24KEc Reduced Instruction Set Computer (RISC) processor and TI's 'C55x DSP. These devices are highly integrated with a rich peripheral set for IP phone applications, reducing the bill-of-materials cost, time to develop and complexity of IP phones. These devices have the critical processor and communication capabilities, as well as the peripheral resources for an entire product line of IP phones. The architecture of the devices ensures high data transfer rates while consuming little power. With TI's Telogy



Software for IP phones, the TNETV1051/1052/1053 chips provide a complete hardware and software solution which reduces system design times.

Software running on the RISC general purpose processor supplies overall system services, including the user interface, network management, protocol stack management, call processing and task scheduling. Software running on the DSP core provides real-time voice processing functions such as echo cancellation, compression, PCM processing and tone generation/detection.

The many peripherals integrated onto the TNETV1051/1052/1053 devices streamline the design process significantly. On-chip peripherals include a 24-bit color LCD controller, 8 x 8 keypad interface, USB 1.1 controller for host or peripheral functionality, two serial UARTs, a programmable serial port, TI's high-speed, low pin-count VLYNQ channel and several general purpose I/O ports. The integrated dual-channel 16-bit codec includes the critical functions needed for IP phone applications, including two ADCs with five programmable inputs and two DACs with four programmable outputs. Other codec features include analog and digital side-tone control, an anti-aliasing filter, programmable gain options and programmable sampling rates of 8 or 16 KHz.

32-bit RISC Processor

- MIPS24KC core at 300 MHz
- 8-stage Pipeline
- 32 KB Instruction Cache
- 16 KB Data Cache
- 256-bit cache line size
- 64-bit memory bus for caches
- Branch History Table (BHT) with 512 entries
- 16-bit DDR (equivalent to 32-bit SDRAM)
- Performance counters for cycles, bad branch prediction, cache misses and other functions.

Digital Signal Processor (DSP)

- C55x core at 150 MHz
- 12 Kwords 2-way set associative Instruction Cache
- 64 Kwords of RAM on chip:
  – 56 Kw SARAM
  – 8 Kw DARAM
- 3 32-bit Timers
  – 2 General Purpose
  – 1 Watchdog

External Memory

- Double Data Rate (DDR) SDRAM EMIF controller
- Asynchronous EMIF supports NAND or NOR flash

Power and Package

- 3.3-v I/O Supply Voltage
- 1.5-v Core Supply Voltage, integrated Voltage Regulator
- Reduced power modes
- 376-Ball PBGA (Plastic Ball Grid Array) package

IP Phone Features - DSP
Voice Codecs G.711 Codec with support for Annex I and II, G.726, G.723.1A, G.729AB, G.722 Wideband Codec, G.722.2 Wideband AMR, GSM-AMR, iLBC
Foreign Exchange Station (FXS) External TDM Enabled
Fax Relay T.38 Fax Relay
Conferencing Up to 6 channels
Echo Cancellation Acoustic Echo Cancellation for Full Duplex Speakerphone when used with properly designed enclosure Doubletalk Detection

IP Phone Features - DSP (continued)

Voice Activity Detector/CNG
- Fixed Threshold
- Adaptive Threshold
- Noise Level Matching
- G.711 Appendix II

Acoustic Echo Removal
- Acoustic Echo Canceller (AEC)
- Tail Length(s): 200ms hands-free, 60ms handset/headset
- AEC Shared memory
- Automatic Gain Control
- Transmit/Receive Transducer Equalization
- Noise Guard
- Comfort Noise Generation for NLP
- NLP attenuation/clipper constraints
- Optimized wideband band-split architecture
- Group Listening
- High Level Compensation

Line Echo Canceller
- G.168-2002
- 0/3/6 dB ERL Configuration
- 32 ms Tail Length

Packet Protocol
- RTP

Packet Loss Concealment
- G.711 Appendix I

DTMF Relay Using RFC2833

Caller ID

300 ms Maximum Jitter Buffer

Encryption Support
- SRTP

Tone Detection and Generation

Packet Loss Recovery
- Redundancy (RFC 2198)

Announcement Support

PIQUA™ Real Time Diagnostics
- Telchemy QoS Support
- PCM Pattern Detection
- Signal Level Measurement and Report
- Jitter Statistics
- Transmit, Receive, Lost Packet Counts
- Loopback Mode

IP Phone Processor Software Product Specifications

Microprocessor Features

IP Phone Platform

Voice Applications Services
- APIs to access DSP Services
- APIs needed to setup DSP for basic and supplementary services
- APIs to generate inband tones
- Sample Display and Keypad Drivers

Sample Network Management Module

MontaVista Linux Support
- Development and any related tools must be obtained through vendor

VxWorks® Support
- Run-Time licenses provided with complete solution (optional)
- Development and any related tools must be obtained through vendor

IPv6 Support

NAT Traversal
- Integrated UPnP stack

Graphics Library Support
- Libraries for WindML and Nano-X Window System

Security Framework
- Security Accelerator engine for DES/3DES/AES Encryption, Public Key Acceleration, Random Number Generation, and SHA1/MD5 Authentication
- Static Packet Filter Drivers
- Secure RTP (SRTP)

PIQUA Elements
- Telchemy VQMON
- RTCP-XR messaging

*Please consult your sales representative for the latest product features and availability. For more information please contact your TI sales representative or call 972-644-5580. **www.ti.com/voip**

TEXAS INSTRUMENTS

SPAT170