Jeff Manuszak
Chris Knaack
EECS 488

WLAN Video Phone

Overview

- The EECS488 Video Phone is targeted to compete with the new Video Mobile Phones available from wireless service provider phones and traditional conference calling equipment.
- Small handheld device similar to a Palm Pilot or wireless phone.

Features & Benefits

- Highly Portable
- Integrates with existing wireless LAN technology
- Cross platform compatible
  - Developed off Microsoft Netmeeting SDK
- Superior Performance at a competitive price.

Applications

- Video Conferencing
- Security/ Surveillance Systems
- Home
- Leisure

Market Analysis

- **Competing Products**
  - **Price Analysis**
  - **Functional Analysis**
  - **Technical Analysis**
- **Market Research**
  - **Market Projection**
  - **Forecast**

Competing Products

Apitek 200t

Tele-Eye LCD

Vialta BM80

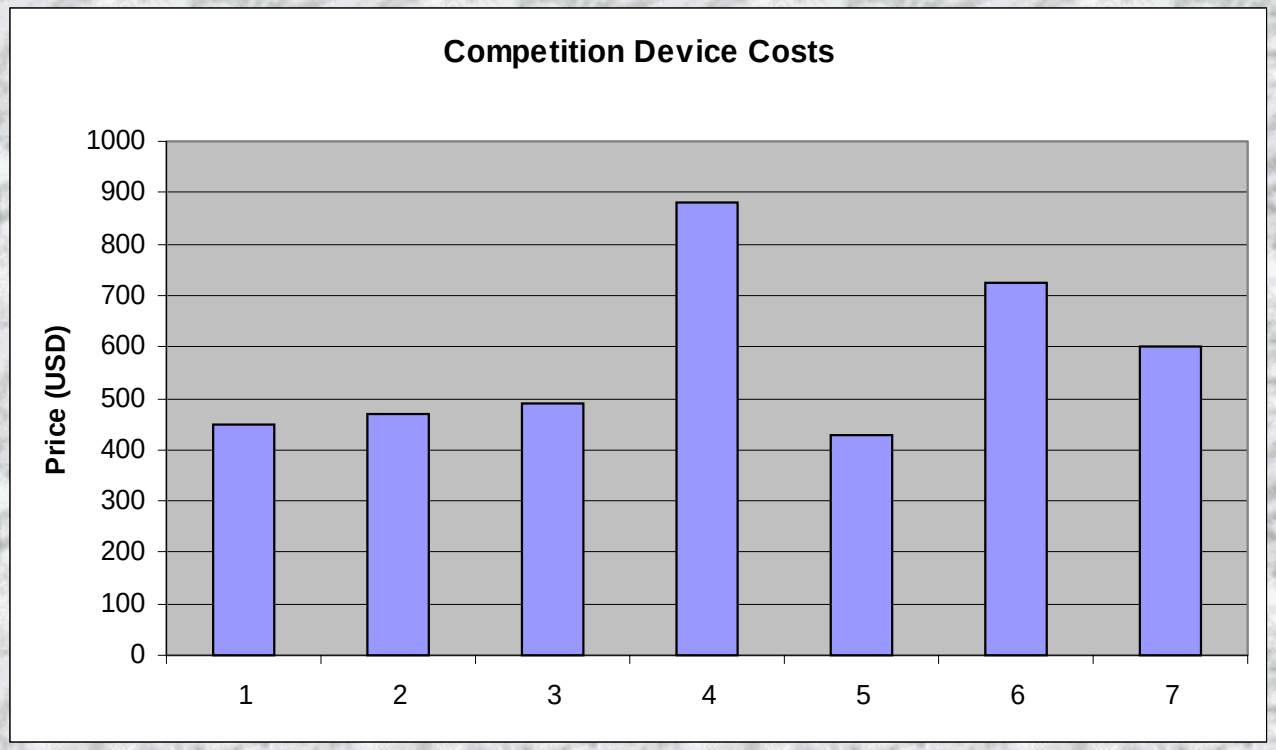
Texas Instruments

IP Phone

Panasonic Victpro

Prosperity VP-41

Price Analysis



- Average price of surveyed competing products $577
- Prices ranged from $400 to almost $900 for similar functionality

Products Surveyed

Product Name	Manufacturer	Price	Description	Features	Missing Features
1 - BM80	Vialta	450	Personal Video Phone Station	Works with a standard POTS phone line and an existing phone, Color motion video	No message recording features
2 - 2000T	Aiptek	470	Video Phone	POTS, .2 inch 250,000 pixel CCD, includes phone and camera, 7 to 8 fps	No message recording features
3 - DV324	8x8	489	Desktop Video Phone	H.324 video standard. POTS, Full Duplex	No message recording features
4 - 2000S	Hyperphone	879	Television Video Phone	H.324 compliant, POTS, 7-8fps, max 15fps, 33.6kbps	No message recording features
5 - Victpro KXC-AP150	Panasonic	429	Video Communication Terminal	POTS, Remote viewing/monitoring	No message recording features
6 - VP-41		723	Video Phone	POTS, H.263, G.723.1, H.245, H.233, PIP, Camera, Mic, Speaker	Audio message recording only, no video
7 - Via Video	Polycom	600	Standalone Video Phone	POTS, H.324	

Functional Analysis

- POTS - Plain Old Telephone System
- Integrated Modems 33.6 - 56K
- Performance: 7 - 8 fps (average), 15 fps (max), 30 fps (local)
- Video Size: 352 x 288, 176 x 144, 128 x 96
- Standard Display: 4 inch LCD
- Typical Camera: 0.2 inch CCD (250,000 pixels)
- Standard Protocol: H.324 - addresses video and audio communications over low bitrate connections such as POTS modem connections

Disadvantages of Competition

- Non-Portable
- Poor performance
- Some require identical models for best results
- Very few definitive standards for functionality and interoperability
- Price is relatively high for the average consumer, especially since two devices are required.
- Performance is low, considering the cost

Advantages of Competition

- Makes use of existing technology that is widely available and understood by the average consumer.
- Easy setup
- Use is similar to a standard telephone
- No hidden charges for other connection services or monthly fees

Comment: With all these standard technologies in use, why the high prices? No wonder this has not caught on in the market!

Market Forcast

International Data Corporation predicts the total shipments of screen phones to exceed 3 million units and the total revenues from these shipments to exceed $550 million.

- The above analysis translates into approximately $183 in revenue per unit

Market Forcast

- Shipments are expected to exceed approx 3 million units:
  - 5% of the market = 150,000 units
  - Required capital:
    - (Unit Cost) * (# of Units) = (Production Capital)
    - ($166.28) * (150,000) = $24,942,000
  - Spread production capital expense over 5 years
    - 10% = $2,494,000
    - 20 % = $4,988,400
    - 30 % = $7,482,600
    - 40 % = $9,976,800

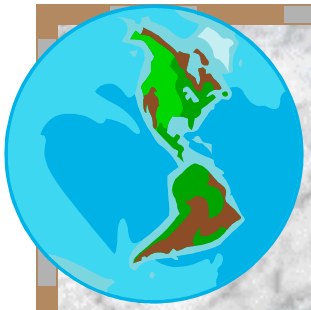
Market Forcast

	Units:	Profit:
Year 1:	15,000 units	$900,000
Year 2:	30,000 units	$1.8 million
Year 3:	45,000 units	$2.7 million
Year 4:	60,000 units	$3.6 million

Profit after 4 years: $9 million USD

At this time initial investors can begin to receive dividends

Product Concept



Message Server

Duplex Communication Via:

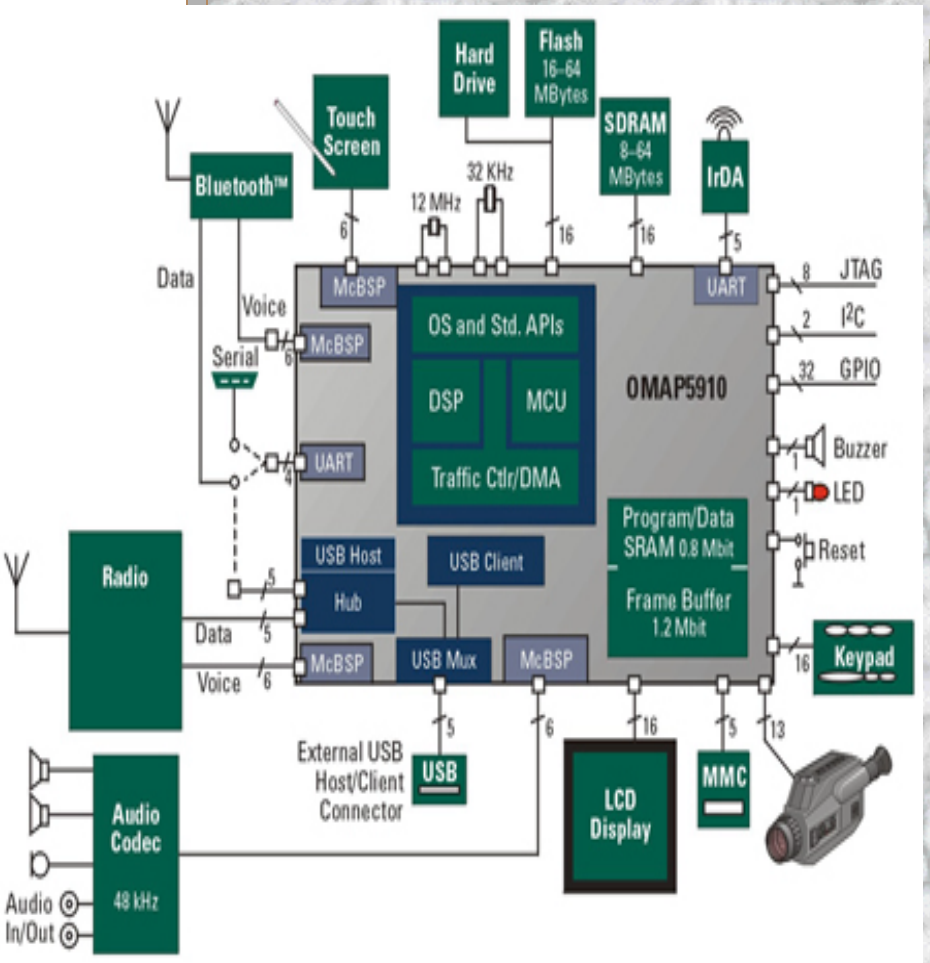
- Ad-Hoc
- WLAN
- Internet

Message storage via remote/local server

Design Focus

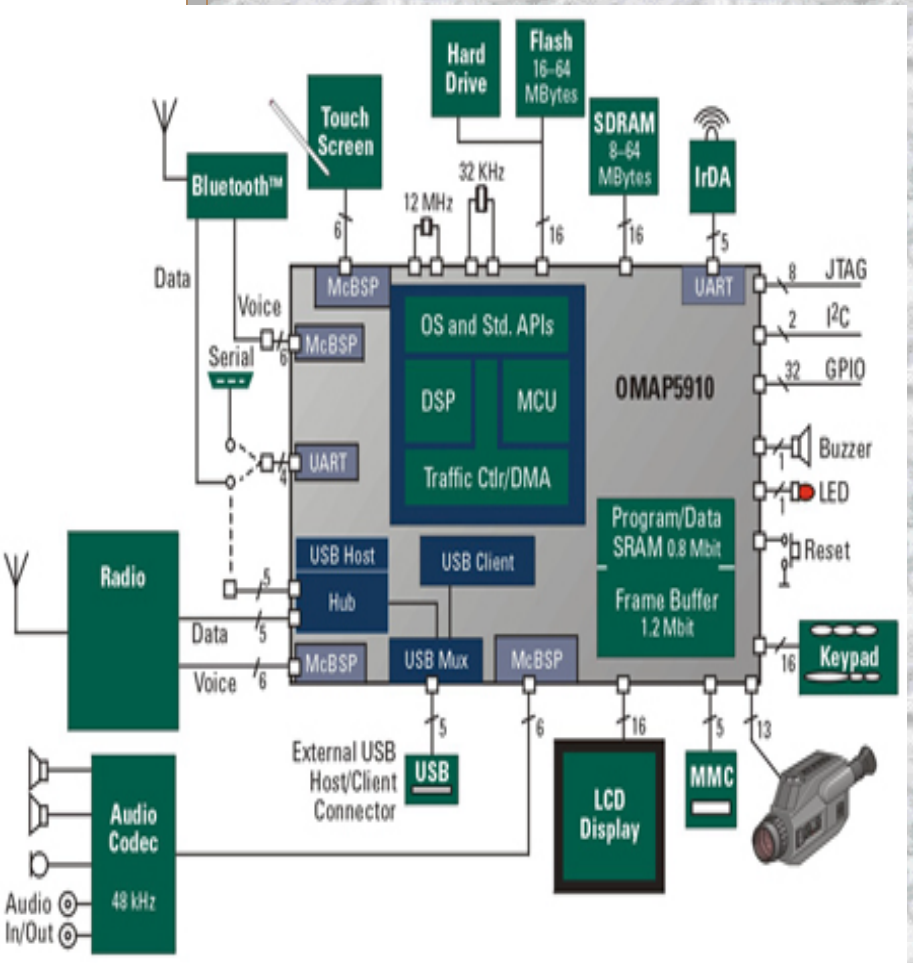
- Speed to Market
  - Utilize off the shelf components.
  - Minimize component count.
  - Use provided software libraries to reduce design time.
- Low Power Consumption
  - More hours between charging
  - Less expensive Battery

Specification - Processor



- Texas Instruments OMAP
  - Targeted for Mobile Multimedia
  - Includes all necessary peripheral ports to reduce hardware development and overall cost.
    - Camera Interface
    - Digital I/O (Keys, Buttons)
    - LCD Display Driver (8-bit RGB)
    - Serial Peripheral Interface for WLAN and Audio Codec Chips
    - FLASH Controller (if needed)
    - UART/USB for Software Download/ Updates

Specification - Processor



- Texas Instruments OMAP
  - Excellent Design Resources
  - Standard TI DSP Libraries
  - Provided compression/decompression algorithms for MPEG, MP3, ATC, etc.
  - Code Composer Studio IDE
    - ANSI C
    - Real Time Debugging/ Breakpoints

Specification - Processor

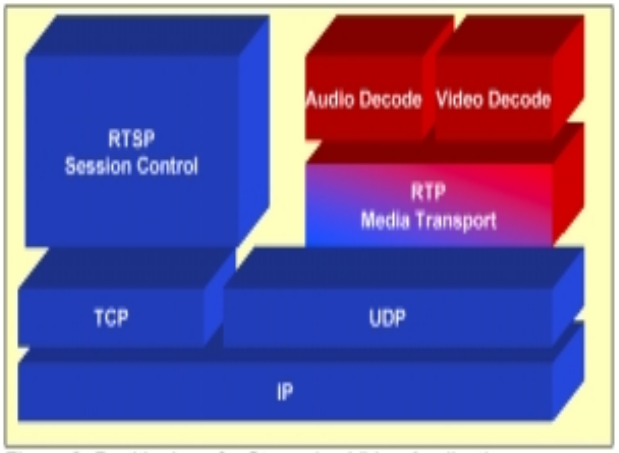


Figure 2: Partitioning of a Streaming Video Application

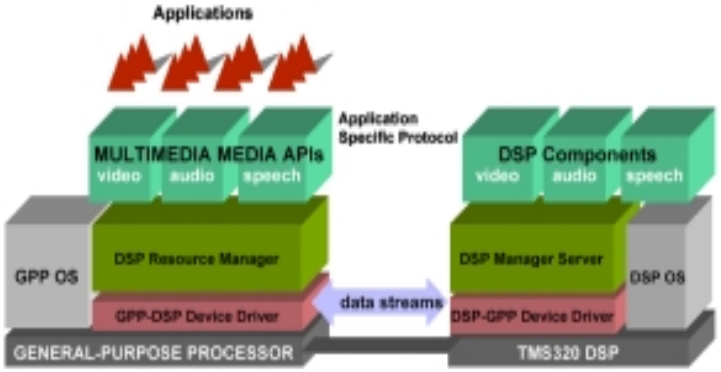


Figure 3: OMAP™ software Architecture

- Texas Instruments OMAP
  - Dual Core RISC/DSP
  - Public Peripherals are accessed in either the DSP or RISC GPP.
  - DSP will handle compression/decompression in real time
  - RISC GPP can be used for Interface and Network Communications.

Specification - Display

NL3224BC35-20

5.5 | 262,144 COLORS | 320 × 240

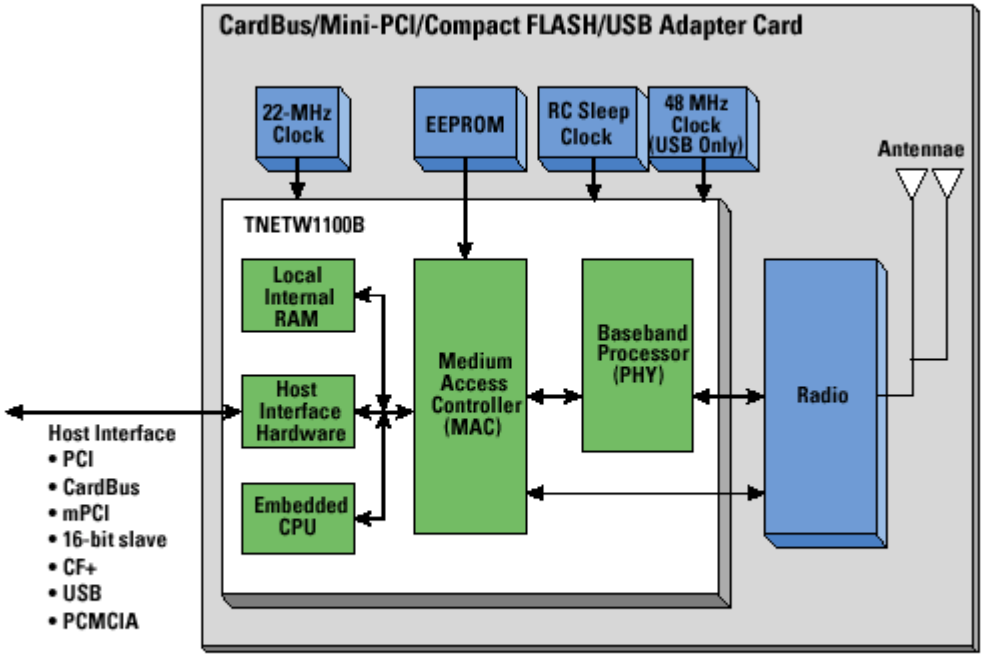
- Digital input, high luminance (400 cd/m^2)
- 5.5-inch screen, wide viewing angle, wide supportable temperature range (-10 C to +70 C): ideal for measurement and industrial monitors

DATA (PDF 503 KB)

Model number	NL3224BC35-20	Screen size	5.5 inches (14 cm diagonal)
Drive method	a-Si TFT active matrix	Effective display area	111.36 (H) x 83.52 (V) mm
Number of pixels	320 x 240	Display colors	262,144 colors
Pixel pitch	0.348 (H) x 0.348 (V) mm	Pixel arrangement	RGB stripe
Luminance	400 cd/m^2	Backlight	2 cold cathode fluorescent lamps

- NEC Color TFT LCD
  - Much Larger than 3.5 inch displays common in competition.
  - Excellent Viewing Angle
  - Low Power Sleep Mode conserves energy when not in use.
  - Touch Screen Capable

Specification - WLAN SoC



TI's TNETW1100B Embedded Single-Chip (MAC and Baseband Processor)

- TI TNETW1100B
- Complete System on Chip WLAN Solution.
- IEEE 802.11b 11 Mbps
- IEEE 802.11g 54 Mbps available in same package (Late 2003)
- Support of WLAN Identification features similar to WLAN PCMCIA used in laptop computers.
- Ad-hoc and Infastructure Modes.
- Support for WLAN Security

Pricing

Component	Manufacturer	Part Number	Cost per Unit	Required Volume
LCD TFT Display	NEC	NL332	$59.00	500+
Microphone	Panasonic	WM-62HNT	$2.04	
Speaker	Panasonic	EAS-2P113D	$4.29	
DSP	TI	OMAP	$36.95	1000+
FLASH	Not Needed	Not Needed		
Camera	Panasonic	GP-CX151/45P	$35.00	
WLAN SOC	TI	TNETW1100B	$19.00	
Packaging	Custom	?	$15.00	
PCB	Custom	?	$10.00	
Development Cost	Engineering	Manhours	$40.00	
Administration	Supply	Warehouse, shipping etc	$15.00	
Profit		20% otherwise buy tech stocks	$60.00	
		Total	$296.28	
		Target Price	$300.00	
		Availabe Capitol	$3.72	
Engineering	ManHours	Salary	Total Development	Per 50,000
	2 X 2000	$100,000 per 2000 hours	$200,000.00	$40.00 per unit

Availability

- Initial Release of Spring 2004.

Verification of Performance

- Theory:
  - Microsoft Netmeeting provides similar audio and video capablities.
  - Typically Netmeeting is used on 10/100 Ethernet based LAN or Internet.
  - Test capability of Netmeeting over Wireless LAN 802.11b to evaluate potential quality of video and audio.

Verification

- Using Netmeeting SDK provided by Microsoft, we developed a simple application that embeds Netmeeting Objects and Controls into a Windows Application.
- Netmeeting Objects will automatically adjust frame rate and compression depending on transmission rate.

Verification

- Setup
- Two Laptops with WLAN 803.11b PCMCIA cards.
- Netmeeting DLL must be available.
- Network is Ad-Hoc.
- Microphone and Internal Speakers

Verification

- Results
- Video and Audio was impressive, better than anticipated.
- Video Frame Rate was adequate for motion perception.
- DEMO!!!!