

Test & Measurement Yesterday, Today and Tomorrow

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Test & Measurement Yesterday, Today and Tomorrow

---From "State-of-Art" to "Be Competitive"
in High Volume Electronic Industries
by PXI/Synthetic T&M Technologies



Agenda

- **High Volume Consumer Electronics :**

A Big Driving force to change T&M Industries
Technologies

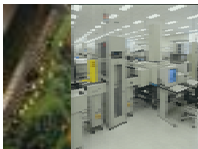
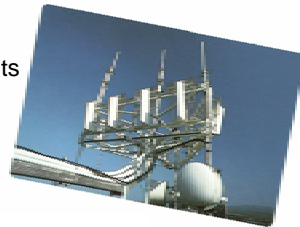
- **How PXI/ Synthetic Instruments fit into the trend**

- **Power of Measurement Information**



Higher Testing Challenges under Limited Budget

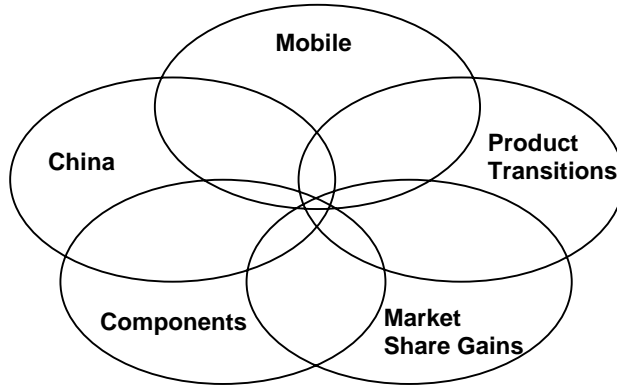
In the past, the complicated signals and Measurement exist only in Multi-Millions equipments and application such as a Microwave Transmitter stations in aero defense. A 250K-USD Tester May be required to test these Mission-Critical Equipments



Nowadays, many of electronic devises such as A Smart phones are using advanced Digital modulation techniques as complicated as an expensive Transmitter station. That improved the quality of the communication signals very well. But The complicated signals and Measurements have to happen around manufacturing sties every days. Unfortunately, a set of mobile phone does cost 100-200 USD. Is the test affordable?



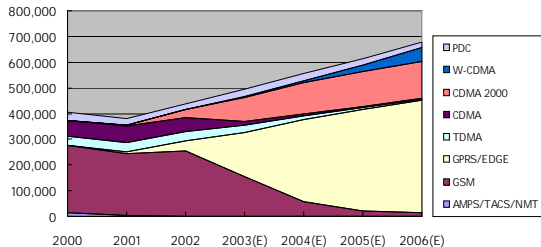
Five Interrelated Operational Themes in key electronic industries



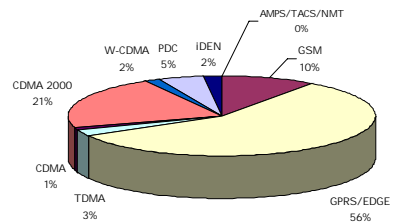
Driving Force Example 1: Mobile Handset

- Challenges:**
- More Functions Needed To Be Tested
 - Lower And Lower Cost
 - Rapid Technologies Advances

Worldwide Handset Shipments by Technology



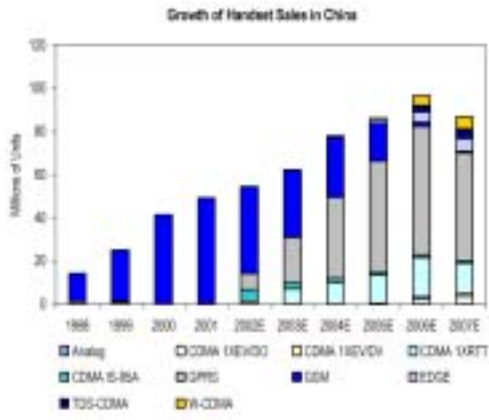
2004 Handset Shipments by Technology



- The transition to GPRS is well underway; EDGE appears ready to emerge in 2004/05
- WCDMA is expected to ramp up in 2004 (10-15M units) and will enjoy a more robust growth in 2005 and 06.
- TDMA (primarily in America), PDC (Japan), analog networks are gradually phased out



2004 China Outlook



- With strong net additions of 63M, total number of China's mobile subscriber reach 270M in 2003

- Cellular penetration rate is only 21% and expected to mount up to 30% over the forecast period

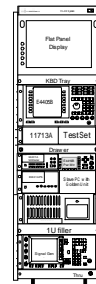
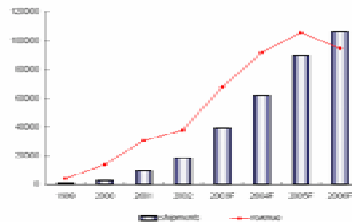
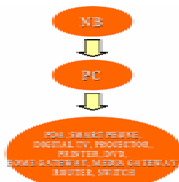
- GSM/GPRS will remain the dominant standard in China, given its large installed base over 200M subscribers whereas CDMA camp continues to gain momentum.

- The competition in price and feature drive manufacturers to increase the efficiency and low the cost in Volume Test



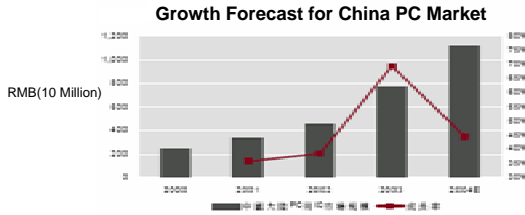
Driving Force Example 2: WLAN Industry

- Challenges:**
- Growth Rate is high
 - Price is getting lower
 - Function is getting better
 - Testing Requirement is getting complicated and unaffordable

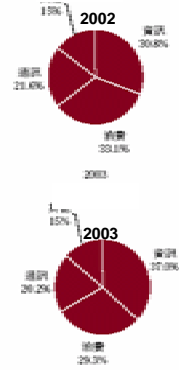


Driving Force Example 3: PC Industries

- Challenges:**
- Very Low Profit
 - Enable The Growth of Key Semiconductor Components



Market share of China end products from 2002 to 2003



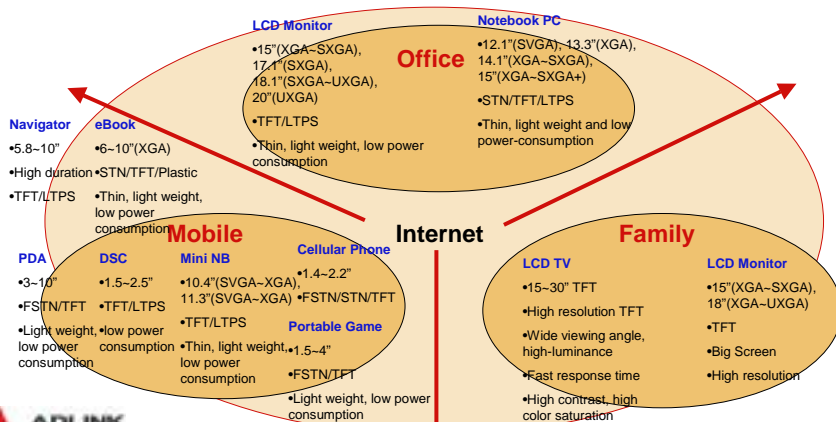
Growth Forecast for China PC related Chips Market

芯片名称	2000	2004E	增长率
CPU	254.9	352.3	31.14%
芯片组	153.3	288.5	50.48%
显卡	147.2	281.7	37.66%
嵌入式CPU	29.8	42.3	41.38%
摄像头	32.7	49.9	52.46%
声卡	22.8	31.8	40.38%
电话芯片	29.8	39.2	41.77%
其他	154.9	197.2	30.37%
TOTAL	787.3	1,197.9	41.45%



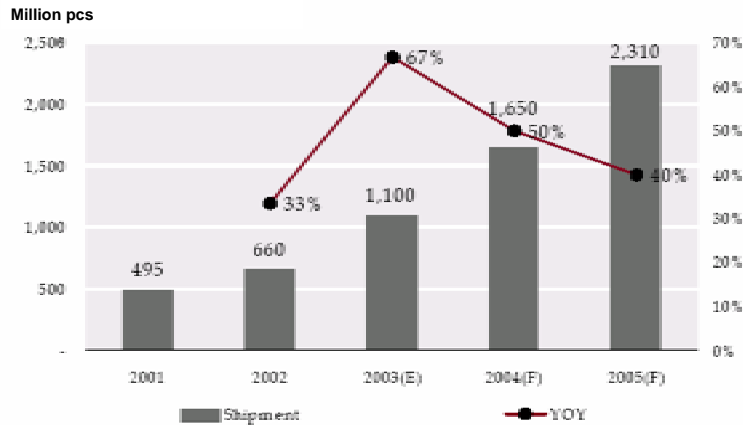
Driving Force Example 4: LCD Product

- Challenges:**
- Product Transition Management
 - High Growth
 - Quality



Applications for LCD products on the end-consumer market

Demands for Driver IC Keep Increasing in 2004, Estimated Growth Rate Up to 50%



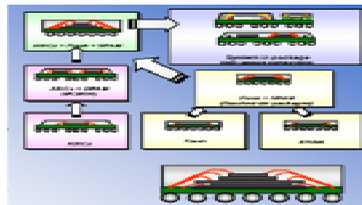
Forecast for global LCD driver IC market size

Driving Force Example 5: Semiconductor Testing

- Challenges:**
- Complicated SoC Function
 - Testing Cost
 - No Complete Testing System

Systemize assembly & testing grows because of the increase of demands for AUDIO/VIDEO/RAM from consumer electronic products, which increased the demand for CSP and SiP products.

Traditional Semiconductor Test System Could not Catch Up the Change of Testing Requirement



Driving Force Example 6: IDM Outsourcing

- Challenges:**
- Lower Testing Cost
 - Time to Market

Hybrid IDM	Partnership	Announced Outsourcing %	Fab-lit Companies	Status of Transition
AMD	50% stake in UMC fab (IBM relationship)	Fabless by '07	Conexant	Sold all fabs
Infinion	30% stake in the UMC fab	50%	Sematech	Sold all fabs
TI	Dongbu and SMIC	40%	Intersil	Only bi-CMOS fabs
ST	TSMC		Agere	Plan to sell all fabs. Today they out-source 33%
Motorola	TSMC	50%	Zarlink	Only bipolar fabs
Oki	UMC			
LSI	TSMC	50%		
Winbond		20% from 5%	AMCC	Just announce fabless status
Toshiba		40% from 7%		
Philips	Partnership with ST/TSMC	50%		
Cypress		25% today		
National		20% today		
Analog		50% by '10		
Zilog	Consolidating fabs			



**Changes in T&M
Automatic Test Equipment Market**

In 2003, the market for VXI-based test and measurement and equipment was estimated to be \$226.4 million while the world market for PXI-based test equipment was estimated to be 84.2 million.

The world market for PCI extensions for instrumentation (PXI) test and measurement equipment is expected to have generated \$84.2 million revenues in 2003. These revenues are forecast to grow to &410.1 million in 2010 at a compound annual growth rate (CAGR) of 25.4 percent.

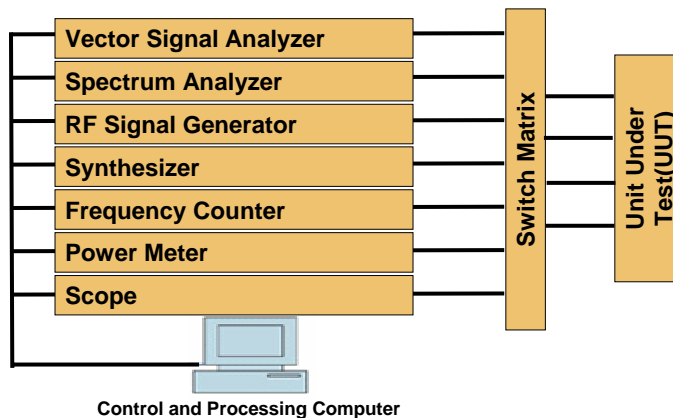


Primary Market Drivers

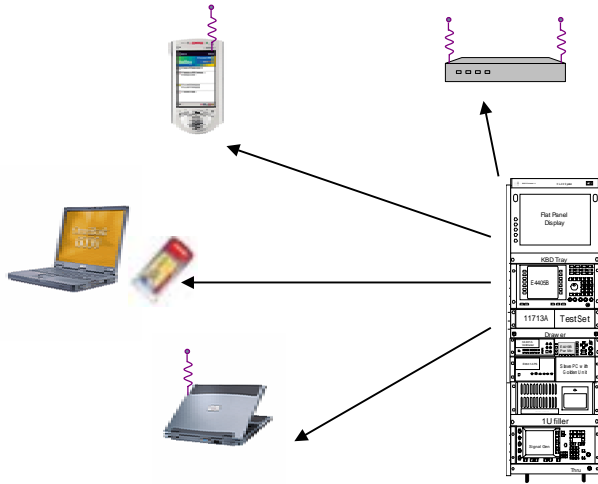
- Increasing focus on price-performance ratio
- Ability of PXI to penetrate into complex applications area
- Low-cost alternative to potential modular system users
- Military, aerospace, and avionics market likely to drive growth in near future
- Applications in RF are bound to drive demand
- High Volume Electronic Manufacturing Test in Asia
- Revival in the semiconductor industry is expected to provide a fillip for further growth
- Throughput drives demand
- Open architecture supports user demand
- Small form factor
- Star trigger and synchronization capabilities



Traditional Automatic Test System



WLAN 802.11 Manufacturing Solution



It is not just about a phone!

No single instrument could meet all of the testing requirement



Smartphone



PDA phone



MP3 phone



Mobile Game Console



WiFi enabled mobile phone



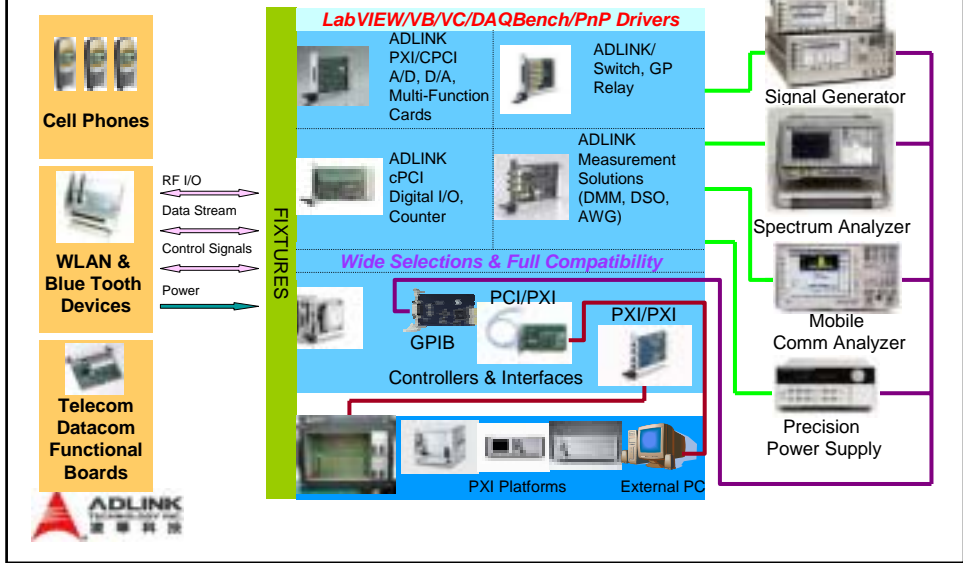
3Mega Pixel Camera Phone



TV phone (analog & DMB)



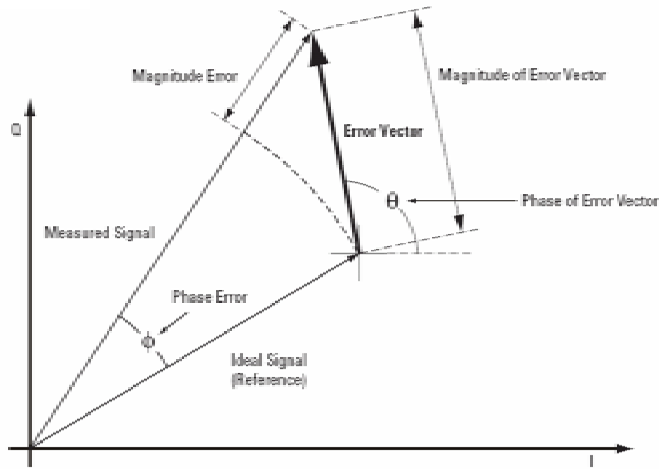
Electronic Manufacturing Testing



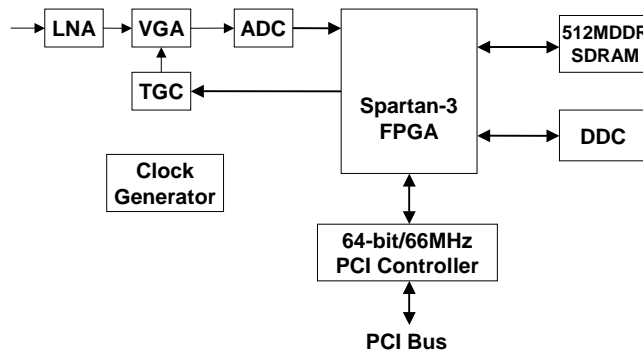
640AM signal analysis accommodates differential encoding for DVB systems, as well as absolute encoding



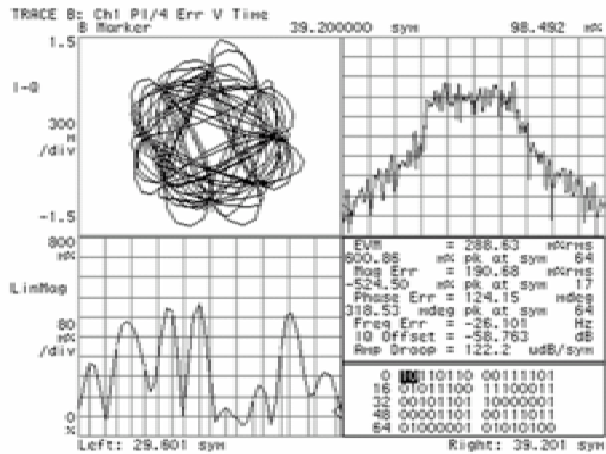
EVM and Related Quantities



A 200Ms/s 12 bit Digitizer Block Diagram



- (a) Polar Diagram
- (b) Magnitude of the error vector spectrum
- (c) Error vector spectrum
- (d) Summary table and symbol table

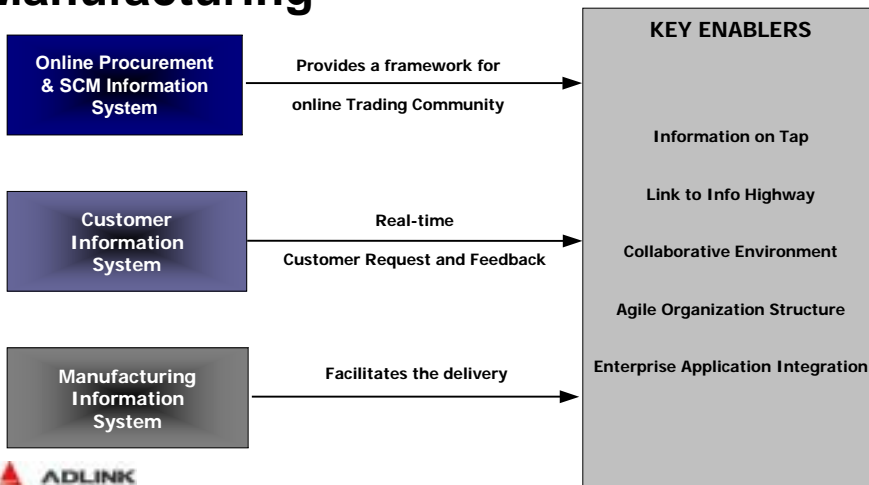


Power of Measurement

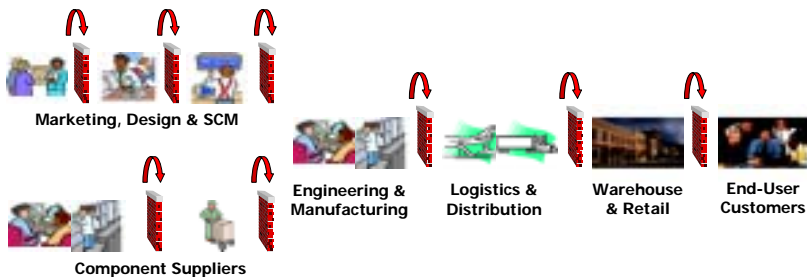
There's an old saying that you can't improve performance until you measure performance



Power of Information for Electronics Manufacturing



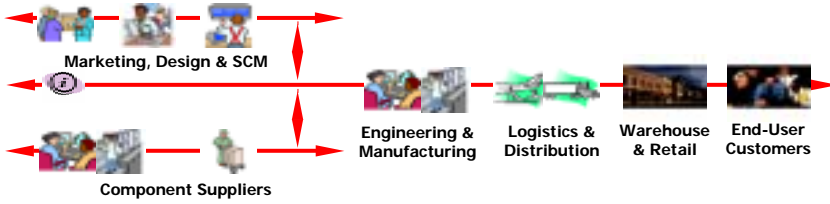
Traditional Supply Chain Model



- Based on a rigid top-down Hierarchical model and not a close loop
- Creates islands of automation within each entity
- Creates barriers between entities
- Impairs the flow of critical information



Streamline Supply Chain Model

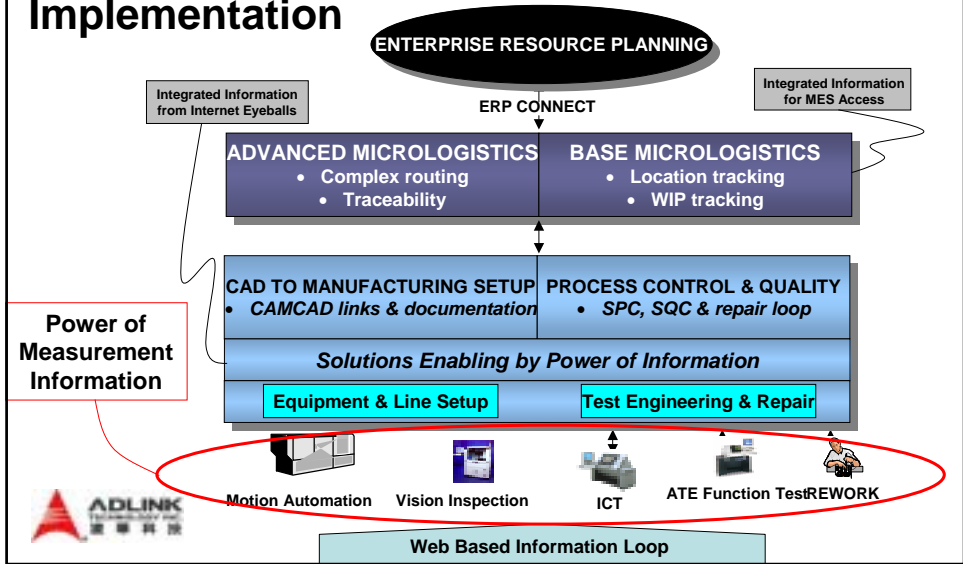


- Collaboration between multiple partnering entities
- Integrated supply chain on information backbone
- Efficient and effective product-cum-services delivery
- Provides Right Information to Right People

Bridging the Information Gap between partnering entities through
collaboration & Integration



Power of Measurement Information Implementation



Measure the Quality and Take Action in Real Time

- Real-time Measurement Information access from any event globally
- Factory floor information upload to e-environment
- Transparency for real-time decision-making
- Access extends throughout supply chain
- Access via Wireless/Web Measurement Instrument



The Power of Measurement Information in the e-environment enables people to make timely and accurate decisions that will determine the success of their business



Conclusion

- High Volume Electronic Industries will need higher testing requirement and lower cost
- PXI is a high performance / cost effective and flexible testing platform compared to legacy VXI Platform
- A key successful factor in the new global competition to have streamline information Flow around manufacturing and testing processes test to make in-time decisions

