IrDA REVIEW, IMPLEMENTATION and IrREADY CERTIFICATION

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IrDA Technology Today

- IrDA is the lowest cost (4Mbps@$2), fastest (16Mbps), smallest (8x2.5x3mm), min. power, and **most private** wireless port you can use today!
- IrDA is the most *scalable* (9.6K-16Mbps) port.
- IrDA-Obex protocol is being incorporated into JEIDA, 3GPP, Bluetooth, WAP, et.al.
- 150M (cumulated) IrDA mobile devices by 1999, 325M by 2000, 400M by 2001, 1.3B by 2003.
- Short range, narrow angle is the **advantage**!
- IrDA, Bluetooth will co-exist for total solution.

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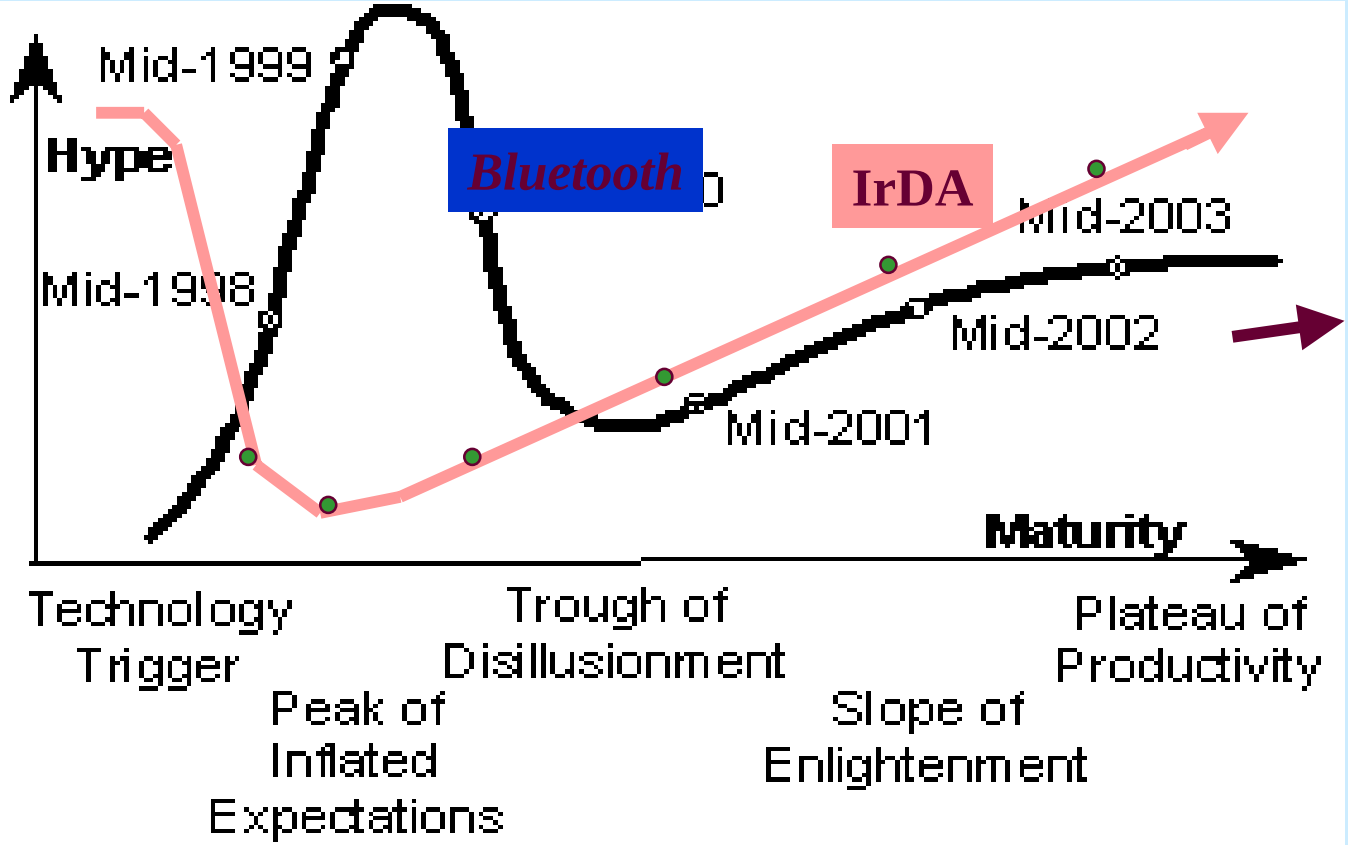
How Far Have We Come!

- Support in all major O.S., Micro-controllers, Mobile devices, in shipped products today:
  - Windows 95, 98, 2000, Millennium, CE
  - Linux, MAC O/S, Palm O/S, EPOCH
  - pSOS, VxWorks, Tornado, Microware, Itron
  - ARM, MIPS, SHx, 68xxx, 80x86, 80C5x, etc.

  - PDA, Smart phone, Industrial data terminal, Printer, Payphone, Medical device, Instrument, Monitor, Pocketgame, Watch, Notebook, etc.

Technology Maturity Curve



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Problem: Inter-Operability

- Can Receive and Also Useful:
  - Approved Application-Layer Protocol.
  - IrOBEX (vCard, Vcalendar, vNotes, vMessage)
  - IrMC/IrSync to come.
- IrReady Program In Action:
  - IrProtocol, IrPhy Test Detail Finalized.
  - Approved 5 Test Labs: Already testing DUT's.
  - Full Rollout from April 2001.

Problem: Desktop Solution

- Windows2000 solved Windows95/98

  IrDA Driver and Appl. SW Problem:

  – IrObex Built into O.S. Easier Set-up.

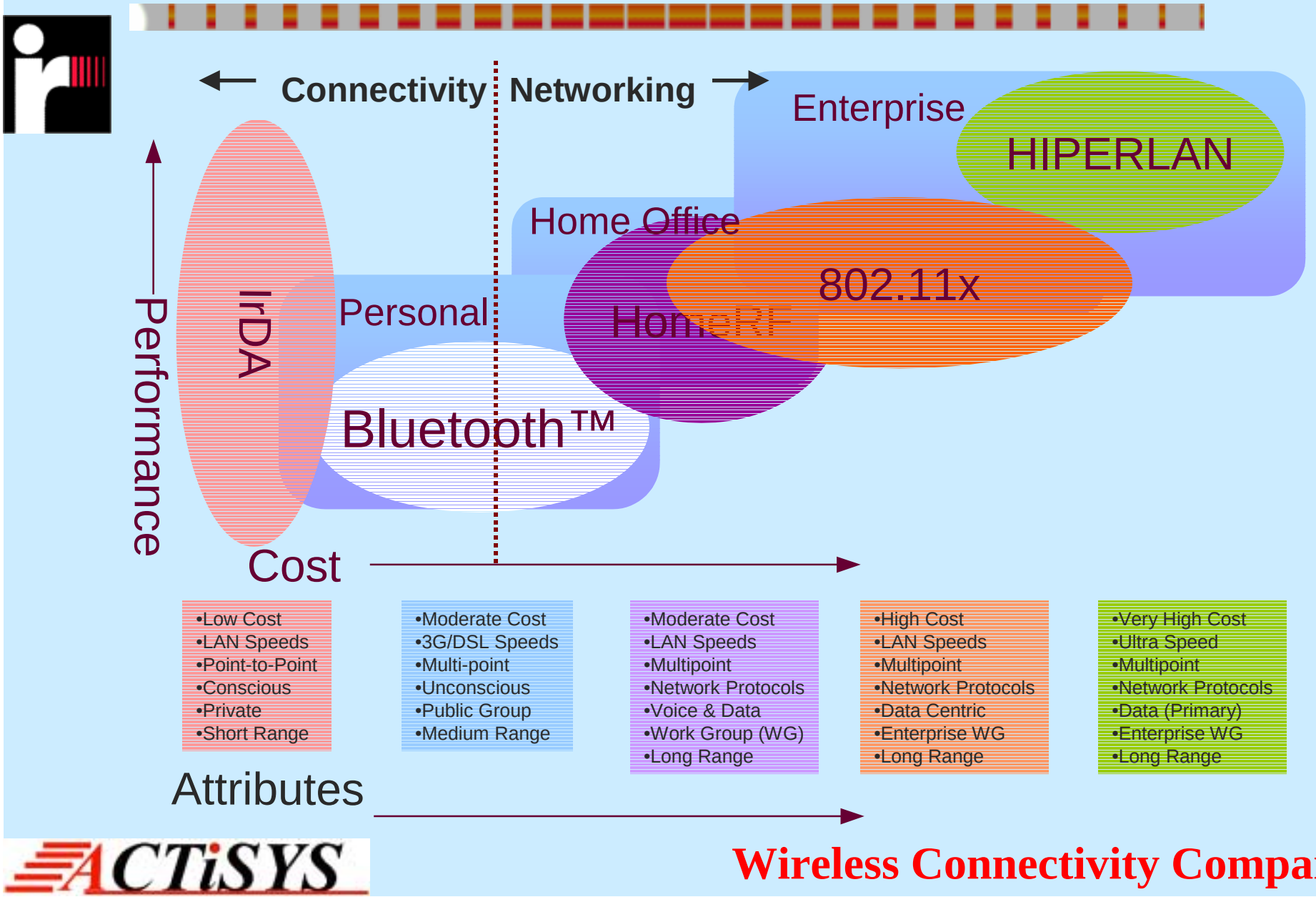
  – IrXfer Link SW is 4X Faster than Windows 98.

- Desktop IrDA Adapter:

  – FIR-USB Adapters from ACTiSYS, others.

  – Intelligent RS232 SIR Adapter from ACTiSYS.

Wireless Technology – Connectivity vs. Networking



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IrDA & Bluetooth Connectivity Application Models

- Conscious Connectivity (IrDA)
  - Point-to-Point Usage
    - Personal information transfer (vcard, vcal, etc…)
    - User initiated synchronization
    - Point-to-point messaging (Financial Messaging)
    - Walk-up-Connectivity (example: printing, MPEG downloads)
- Unconscious Connectivity (Bluetooth)

  - Personal Area Networking
    - Voice
    - Network Synchronization
    - Shared access device connectivity
    - Broadcast

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Comparing Bluetooth & IrDA – 'The 5X Rule'

- "The IR 5X Rule" – IR is ALWAYS:
  - 5X faster than Bluetooth @:
  - 10^5 better BER (Bit Error Rate) (IrDA= 10^{-8})
  - 5X lower cost than Bluetooth (10X for now)
  - 5X smaller than Bluetooth
  - 5X lower power than Bluetooth
  - 5X easier to use than Bluetooth (for now)
- So….Combined IrDA & Bluetooth value is greater than the individual values separately, combined costs are <1.1x Bluetooth cost

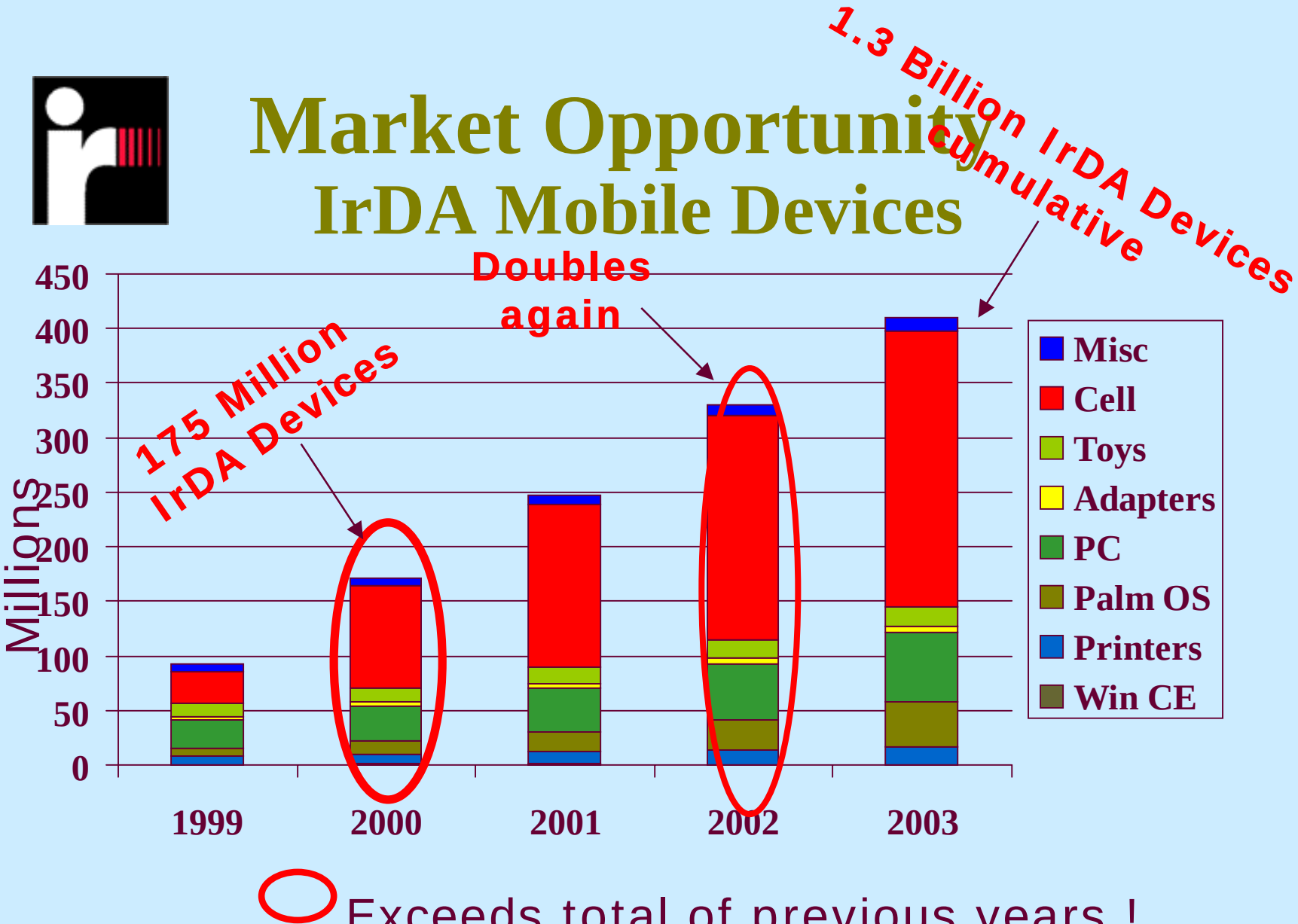
Status and Forecast

- IR is very alive, it has just suffered from some indigestion
- Bluetooth will grow, but needs to plan for shipment of antacid to prevent the same fate
- Both are connectivity, not necessarily networks
- Networks are not the end-point of Internet connectivity, the user is the end-point
- Users need to learn ‘wireless’
- Both IR & RF are needed to solve all user wireless needs
- Industry focus needs to be on applications, not technology for wireless connectivity to succeed

IrDA Market Trends

- 180 Million IrDA-enabled products shipped in 2000
- 2000 shipments exceed all previous years combined
- Over 300 million IrDA products enabled to date
- Project 1.3 BILLION IrDA-enabled products by 2003
- Growth from ‘Mobile Appliances’ more than PCs
  - Palm & other handhelds
  - Mobile phones
- Mobile applications & access fueling future growth

Market Opportunity
IrDA Mobile Devices



Exceeds total of previous years !

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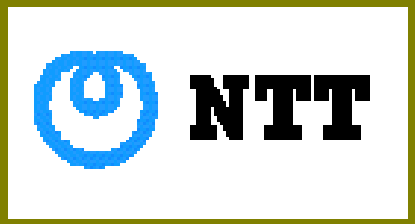
Emerging New Applications & Spec.

- Transaction Processing
  - Financial Messaging
    - Confinity,Cross Check, Personal Solutions, NCR, Verifone
  - PIM information exchange
    - IrMC (Infrared Mobile Communicator)
    - IrWW (Infrared Wrist Watch)
- High Speed Applications (16Mbps)
  - Scanners
  - LAN access & port replication

January 30th 2001
IrDA General Meeting

IrDA for Wrist Watches (IrWW) Updates

Link Evolution
Gontaro Kitazumi (IrWW SIG)



IR Business Card exchange

can send owner’s business card.
Exchange Phone book on Cell phone.
Backup / Restore Phone book to / from PC

‘IrRadio’

IrRadio Transmitter
500kbyte/sec
MP3 and Java Objects

IrRadio Receiver
10Mbytes Capacity
MP3 player

It is possible for PDAs with IrDA FIR to receive this service.

Infrared Radio (IrRadio/IrShower) Application

- Broadcast MP3, Java (Infrared Downstream data)
- Use IrDA FIR physical layer and IrBRC Protocol


ZOOP LIFE!
ZOOP
MOBILE PAYMENT SERVICE
COFFEE & CAN
MOBILE
PAYMENT
SERVICE

Austria: IR, 3-lane Multi Lane Free Flow

IrDA IMPLEMENTATION

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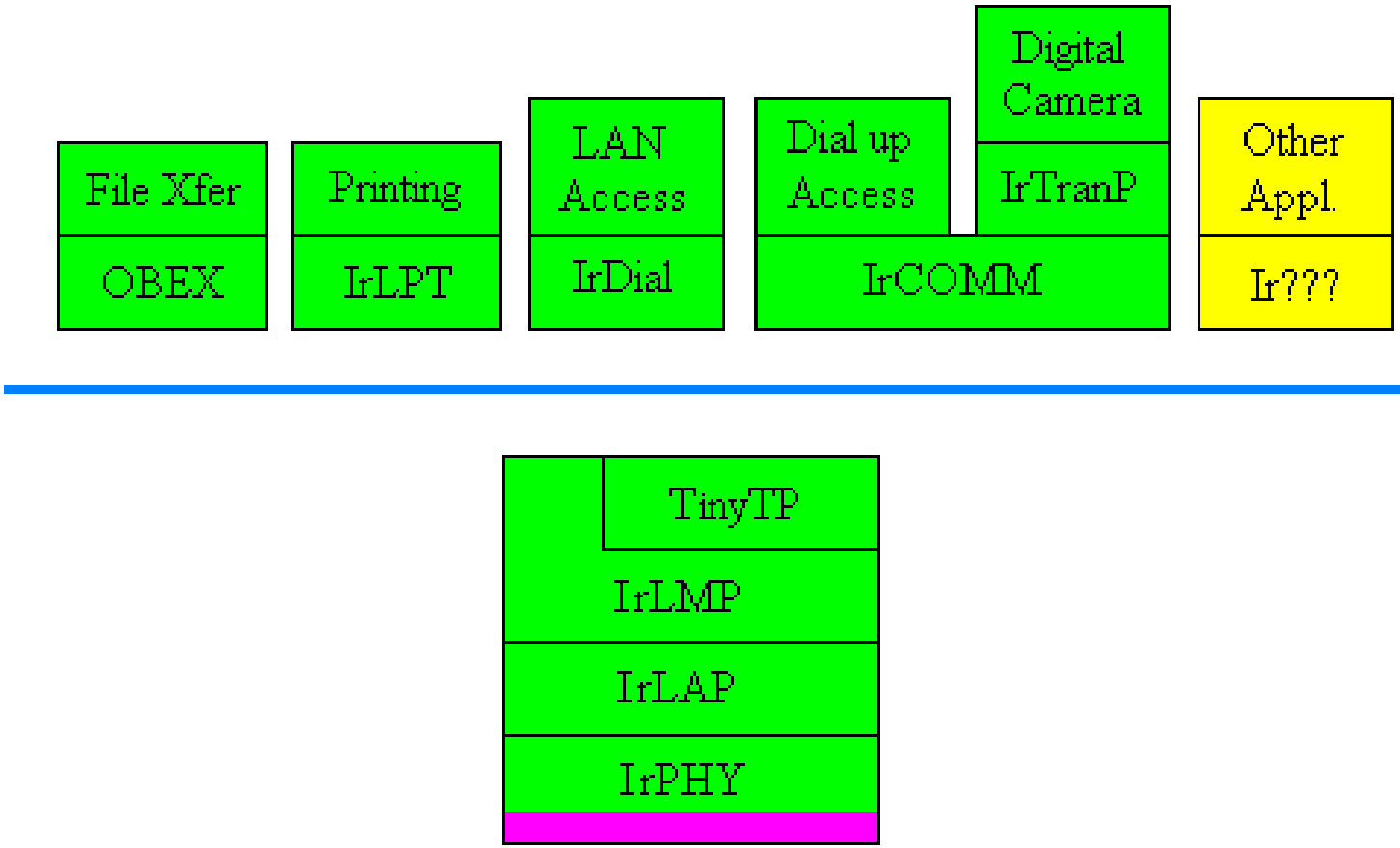
IrDA IMPLEMENTATION ISSUES

- What IrDA Features To Include?
- What System Resources Are Needed?
- How To Put Them Together?
- Any Instant IrDA Solution?
- How to Pass IrReady Certification?
- Applications Profiles



Typical IrDA Stack in a PC

OUR REAL EXAMPLES

- Industrial Portable Data Terminal
- PDA
- Digital Camera
- Cell Phone or Smart Phone
- Pager
- IR Modem
- Printers
- Medical Monitoring Device

Implementation Considerations

Hardware issues

System resources

Software issues

IrDA compliance tests

Production and QA tests

Time to market

Instant IrDA Solution

ACTiSYS *ACT-IR100S/Si*

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RS232 Devices

Serial Printers

Modems

Terminals

Medical Instruments

Industrial Controllers

And many others

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IrREADY CERTIFICATION

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IrREADY CERTIFICATION TEST

- Must Pass: IrPHY, IrProtocol, Profile Tests
- IrPHY Tests: BER (Bit Error Rate), Intensity, Sensitivity, Timing
- Application Profile Inter-op Test:
  * Point and Shoot,
  * IrWW,
  * IrMC,
  * IrFM

IrDA Certification Test Lab

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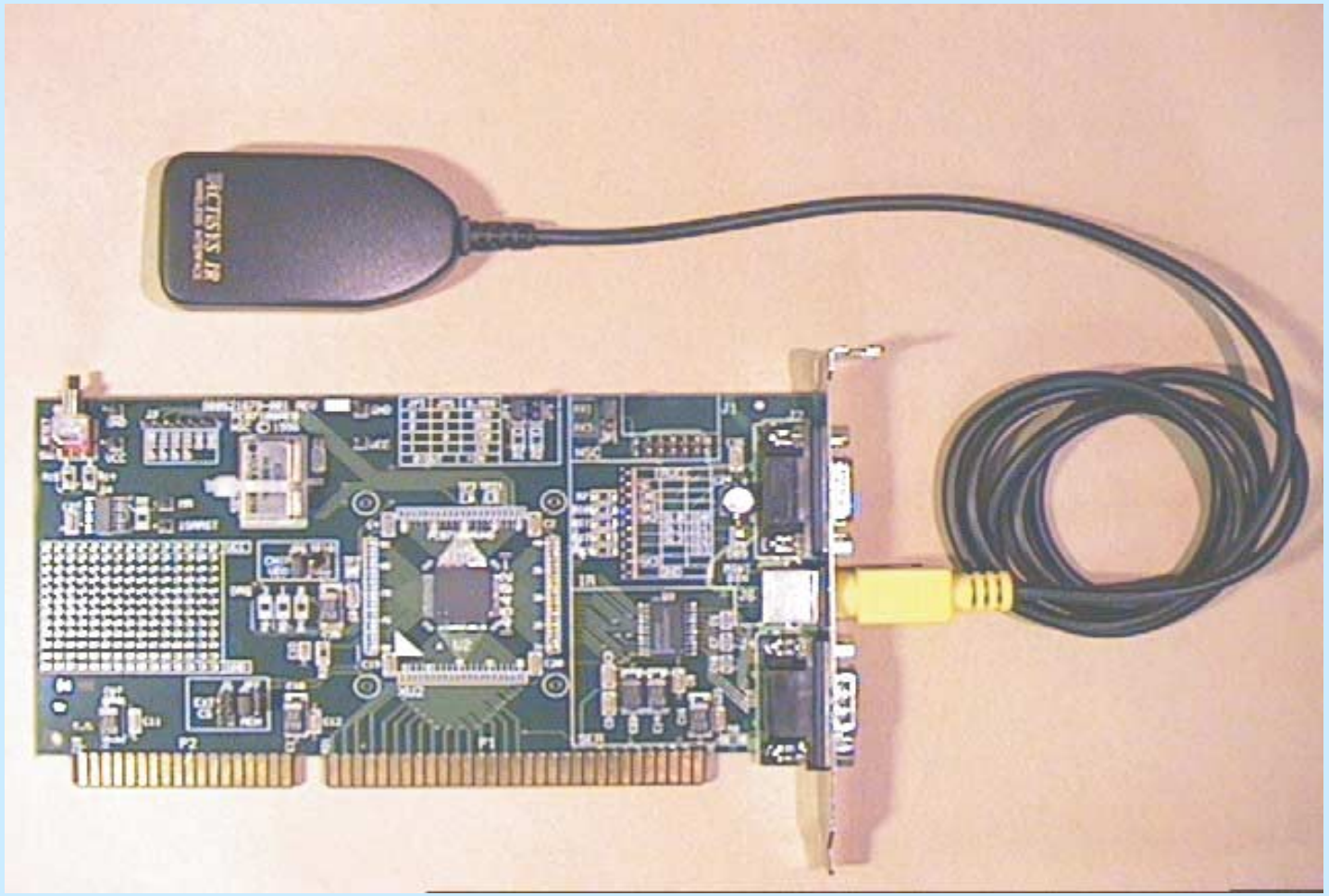
ACTiSYS FIR DESKTOP TESTER, *ACTiR 2000BL*



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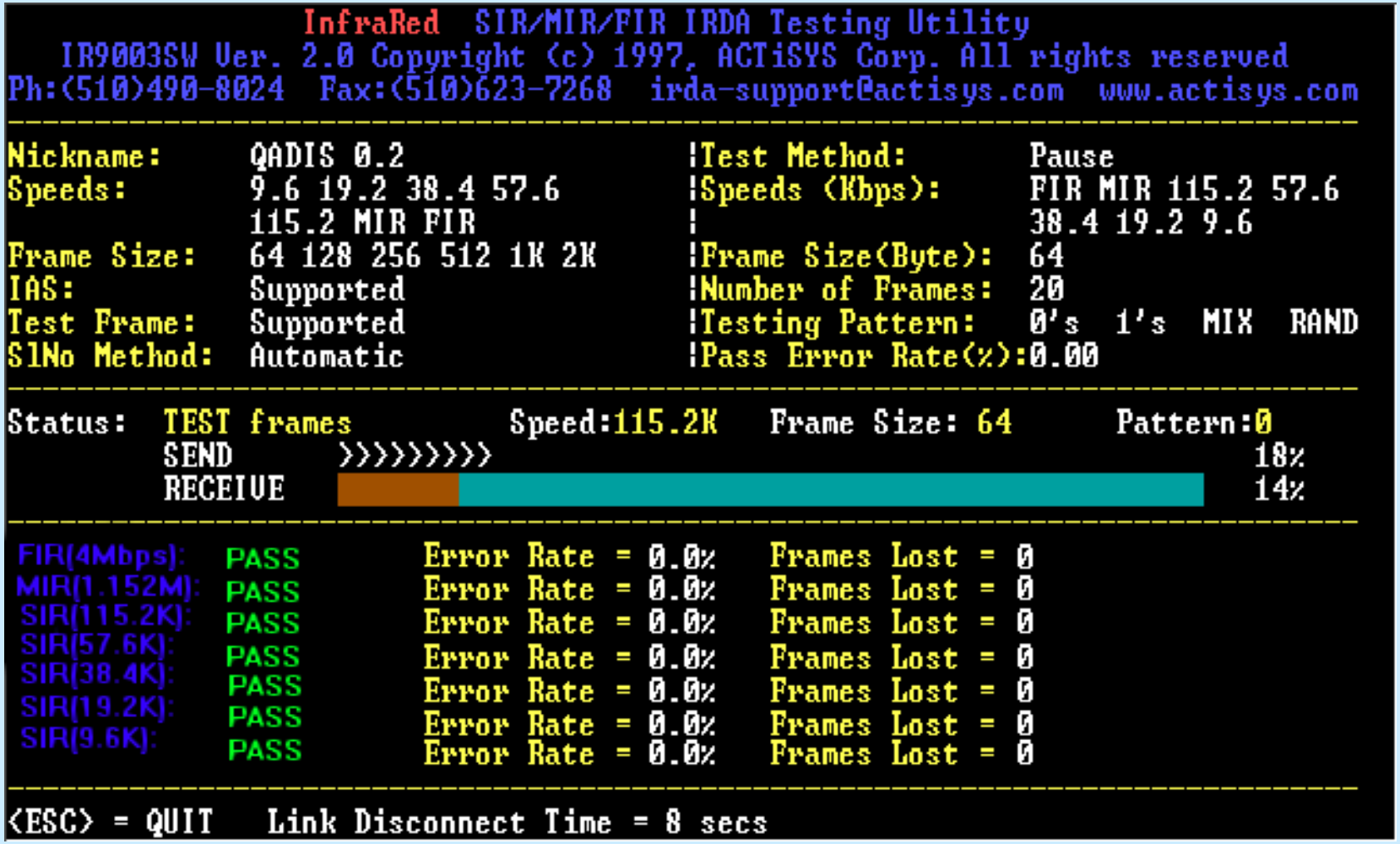
IrDA Certification Test Lab



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ACTiSYS HANDHELD TESTER, *IR3000M*

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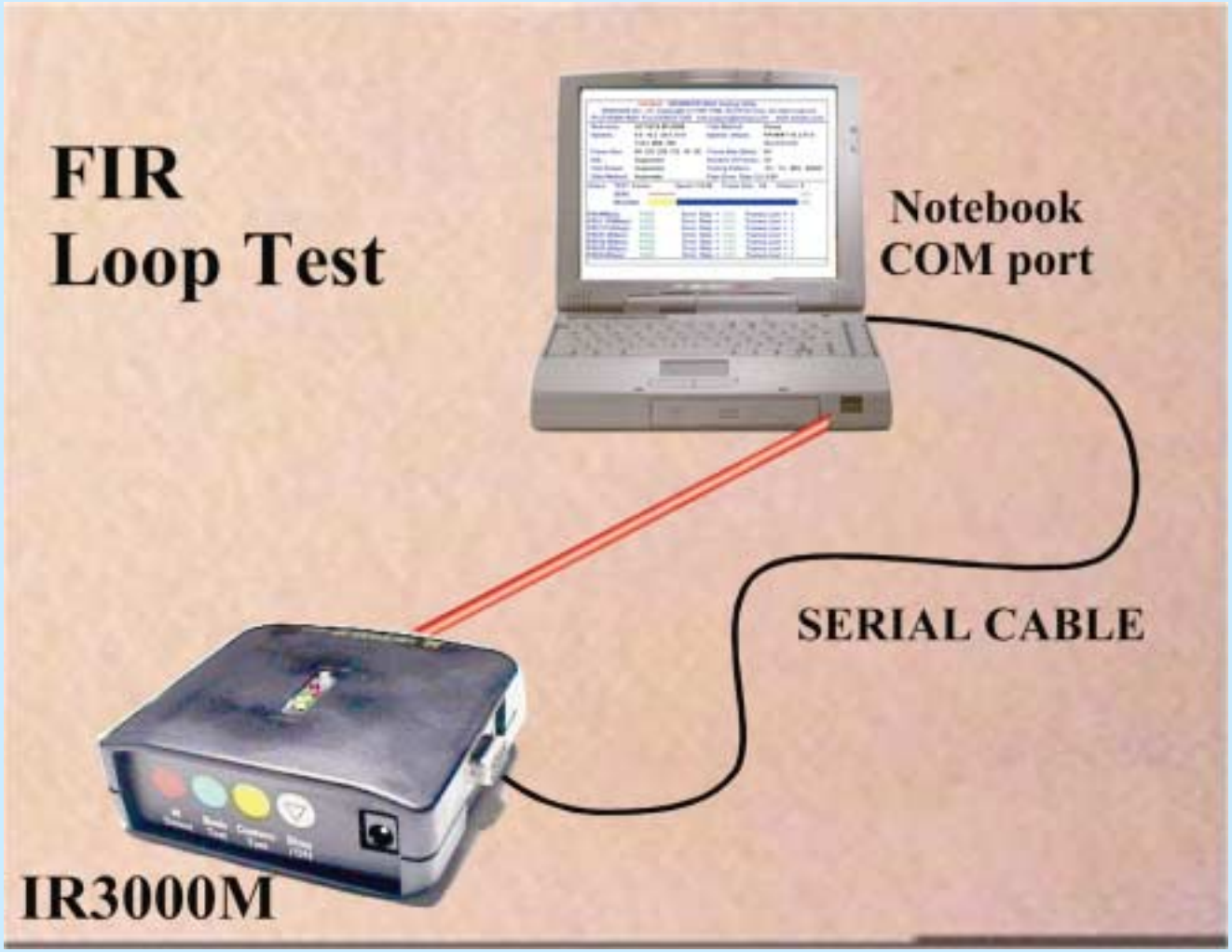
IrDA Certification Test Lab



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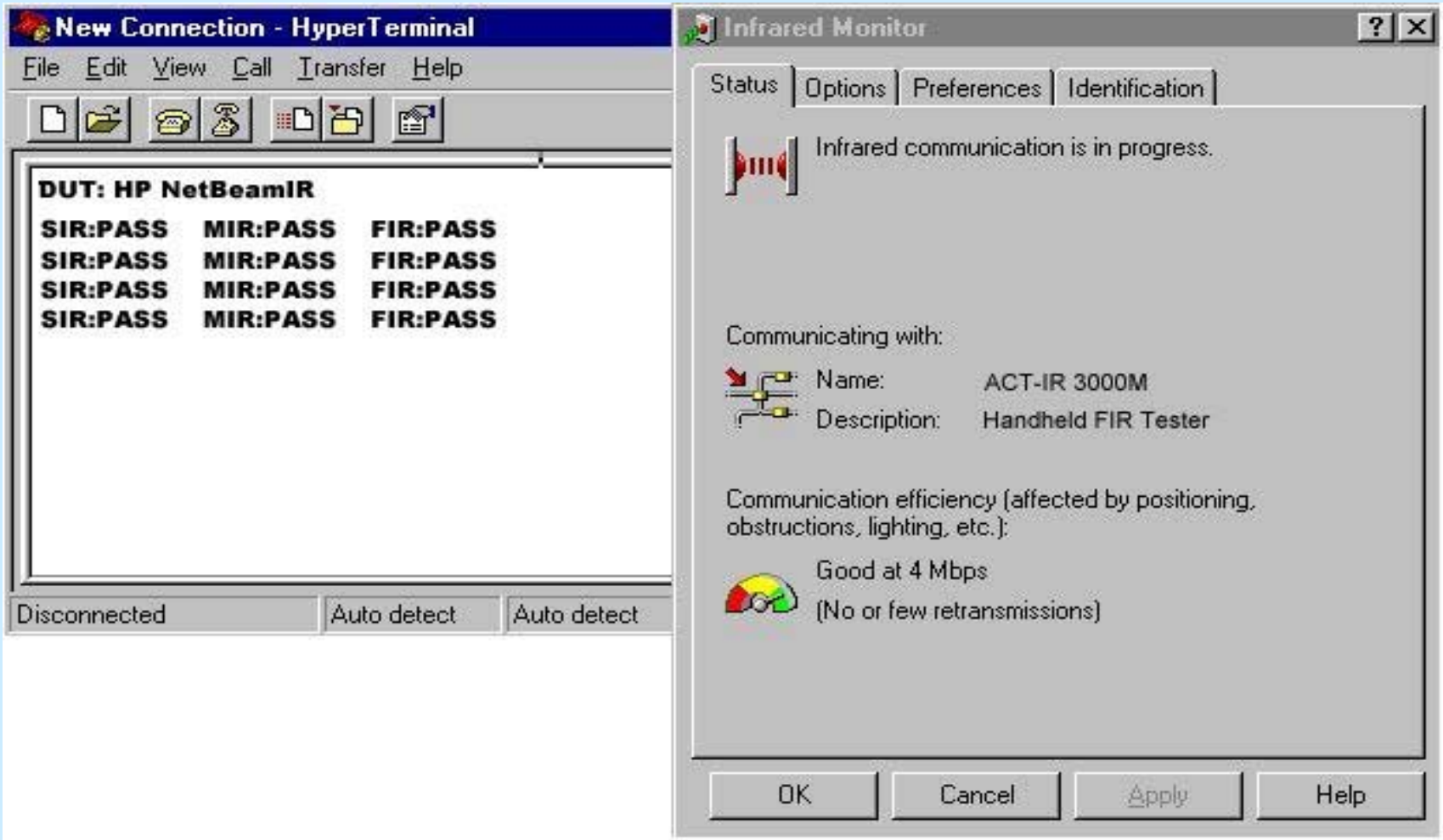
FIR EASY LOOP TEST, ACT-IR3000M



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IrDA Inter-Op Target Devices

- Digital Cameras: Casio7000SX, Kodak
- PDA: Palm, WindowsCE-Casio
- Printers: HP-5P/6P, O'Neil, Extech
- Cellphone,Pager: Nokia, Siemens, Motorola
- Industrial HHT: Telxon
- NotebookPC: Windows95/98/2k/ME, Linux
- Consumer Device: Casio-IrWW, etc.

ACTiSYS **IrDA Test Lab.,** *Fremont, Ca.* *Science-Based Park, Taiwan* *www.actisys.com*

Infrared IrDA FIR Device

BER TEST (Bit Error Rate)

REFERENCE: IrDA Tester

DUT Distance FIR / SIR	DUT Angle	NFS (Near Field Source) Min. Distance Test — Irradiance = 500mW/cm² at 0cm							FFS (Far Field Source) Max. Distance Test — 1. Irradiance = 10uW/cm² = 100mW/Sr at 100cm to test 4M & 1.152M bps; 2. Irradiance = 4uW/cm² = 100mW/Sr at 158cm to test 115.2Kbps & below						
Speeds		4M bps	1.152M bps	115.2K bps	57.6K bps	38.4K bps	19.2K bps	9.6K bps	4M bps	1.152M bps	115.2K bps	57.6K bps	38.4K bps	19.2K bps	9.6K bps
Test File Size		100M bits	100M bits	10M bits	10M bits	10M bits	10M bits	10M bits	100M bits	100M bits	10M bits	10M bits	10M bits	10M bits	10M bits
1cm	0 degree	0×10^{-8}	Not Supported	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}							
75cm / 158cm	0 degree								0×10^{-8}	Not Supported	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}
75cm / 158cm	Left 15 degree								0×10^{-8}	Not Supported	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}
75cm / 158cm	Right 15 degree								0×10^{-8}	Not Supported	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}
75cm / 158cm	Up 15 degree								0×10^{-8}	Not Supported	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}
75cm / 158cm	Down 15 degree								0×10^{-8}	Not Supported	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}	0×10^{-7}

Note : REFERENCE = Desktop PC + ACTiSYS IR2000B/L Tester, IR9003SW ACTiSYS IrDA System Test SW.

DUT = FIR Device , attached to desktop PC. Install Windows 98.

Test File 1 = (40Frames x 256Bytes/Frame x 8Bits/byte) x 1221Test Cycles = (20Frames x 256Bytes/Frame x 8Bits/byte x 4patterns) x 611Test Cycles = 100Mbits.

Test File 2 = (4Frames x 256Bytes/Frame x 8Bits/byte) x 1221Test Cycles = 10Mbits.

Test Person : Nick Juang | Signature : Vincent Cheng | Date : August 15, 2000

Infrared IrDA FIR Device		4M bps							1.152M bps						
INTENSITY MEASUREMENT	Angles	0 degree	Left 15 degree	Right 15 degree	Up 15 degree	Down 15 degree	Left 30 degree	Right 30 degree	0 degree	Left 15 degree	Right 15 degree	Up 15 degree	Down 15 degree	Left 30 degree	Right 30 degree
DUT															
IrDA Spec.	Intensity (mW/Sr)	100mW/Sr ~ 500mW/Sr (+/-15 degree)							100mW/Sr ~ 500mW/Sr (+/-15 degree)						
FIR Device		276.3	156	108	227.5	243.8	25.5	22.2	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported

INTENSITY MEASUREMENT		115.2K bps							9.6K bps						
R_{LED} = 15 ohm	Angles	0 degree	Left 15 degree	Right 15 degree	Up 15 degree	Down 15 degree	Left 30 degree	Right 30 degree	0 degree	Left 15 degree	Right 15 degree	Up 15 degree	Down 15 degree	Left 30 degree	Right 30 degree
DUT															
IrDA Spec.	Intensity (mW/Sr)	100mW/Sr ~ 500mW/Sr (+/-15 degree)							100mW/Sr ~ 500mW/Sr (+/-15 degree)						
FIR Device		276.3	156	108	227.5	243.8	25.5	22.2	276.3	156	108	227.5	243.8	25.5	22.2

Test Person : Nick Juang Signature : Vincent Cheng Date : August 16, 2000

ACTiSYS *IrDA Test Lab.,* *Fremont, Ca.* *Science-Based Park, Taiwan* *www.actisys.com*

Infrared IrDA FIR Device	REFERENCE IrDA Tester	Irradiance = 100mW/Sr						
	Speeds	4M bps	1.152M bps	115.2KK bps	57.6K bps	38.4K bps	19.2K bps	9.6K bps
SENSITIVITY TEST	Test File Size	100M bits	100M bits	10M bits	10M bits	10M bits	10M bits	10M bits
DUT Distance	cm	75		166	185	196	196	194
IrDA Spec.	uW/cm^2	≤ 10.00	≤ 10.00	≤ 4.00	≤ 4.00	≤ 4.00	≤ 4.00	≤ 4.00
Sensitivity	uW/cm^2	17.78	Not supported	3.63	2.92	2.60	2.60	2.66

Test Person : Nick Juang Signature : Vincent Cheng Date : August 16, 2000

Infrared IrDA FIR Device

IrDA P-n-S Inter-Operability Profile TEST

Reference Devices	Corresponding Application Software	DUT	O.S.	Windows 98/Se		Windows 2000		Windows Me	
		ACT- IR2000U Connected to 586 PC		Put	Get	Put	Get	Put	Get
Palm V	Palm Desktop			V	V	V	V	V	V
WinCE	WinCE Report PPC			V	V	V	V	V	V
Telxon HHT	HyperTerminal			V	V	Software not Support		V	V
Nokia 7110	FoneSync			V	V	Software not Support		Software not Support ?	
HP Lj-6MP	MS-Word			V	N/A	V	N/A	V	N/A
ACT-IR2000B/L	IrXfer, IrConnect			V	V	V	V	V	V
ACT-IR100S	HyperTerminal			V	V	Software not Support		V	V
ACT-IR100M	MS-Word			V	N/A	V	N/A	N/A	N/A
ACT-IR220L+	IrXfer, IrConnect			V	V	V	V	V	V

Test Person : Nick Juang | Signature : Vincent Cheng | Date : October 06, 2000

Certificate of Achievement

FIR Device Adapter IrDA Inter-Operability Testing Result

Device Under Test: FIR Decive Adapter

Reference System: ACTiSYS IrDA Test Suite

1) IrDA Bit Error Rate Test:

Reference Device? Desktop tester Ir9003SW + IR2000B/L;Actisys handheld tester;Ir3000M+ Ir3000sw.

2) IrDA Intensity Timing Characteristics Test:

Reference Device: Oscilloscope , Photodiode , OVC (Optical Power To Voltage Converter)
Fast PIN photodiode and test circuit (THORLABS DET 210)

3) IrDA Transmitter Timing Characteristics Test:

Reference Device: Oscilloscope , Photodiode , OVC (Optical Power To Voltage Converter)
Fast PIN photodiode and test circuit (THORLABS DET 210)

4) IrDA Protocol Test: Use Genoa/ESI IrDA protocol analyzer.

5) IrDA Inter-Operability test:

? Win98/SE/2000 (Windows ME/Nov.15,2000).	? Palm V	? Telxon industrial data terminal
? Cellphone Nokia 7110.	? HP laser jet/6MP Fir Laser Printer	? Actisys IR220L+, RS232 PC dongle
? IR100M, SIR Printer adapter	? IR2000B/L, FIR ISA board & dongle	? ACTiSYS IR100S RS232 Intelligent dongle

Test Result:

FIR Device has passed the IrDA Bit Error Rate Test.
FIR Device has passed the IrDA Intensity Test.
FIR Device has passed the IrDA Timing Characteristics Test
FIR Device has passed the IrDA Protocol Test.
FIR Device has passed the IrDA P-n-S Inter-Operability Test.

Test Lab Manager: Vincent Cheng Date: August 18, 2000
Test Lab Engineer: Nick Juang Date: August 18, 2000

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IrReady

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