



Requirements and Challenges for 3G mobile terminal Test

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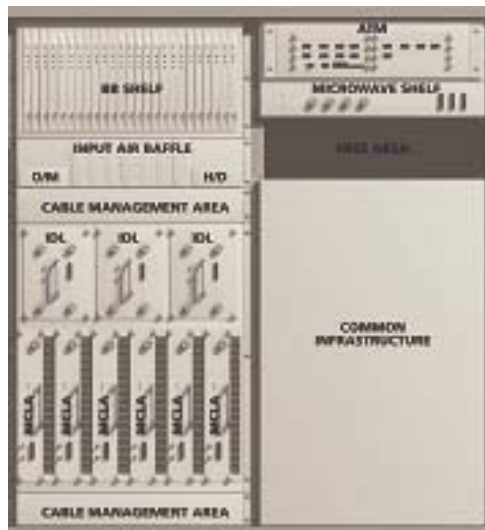
Agenda – A Heuristic Approach

- ◆ WCDMA Tester Product Requirements
 - I: Lucent experience (Network Equipment)
 - II: Wiscom Tech experience (mobile terminal)
 - III-IV: ITRI, III experience (Baseband, protocol)
 - V-VI: Customer experience (operators, manufacturers)
- ◆ WCDMA Tester Product Challenges
- ◆ Meet the Challenges
 - The fourth year SysAir venture experience

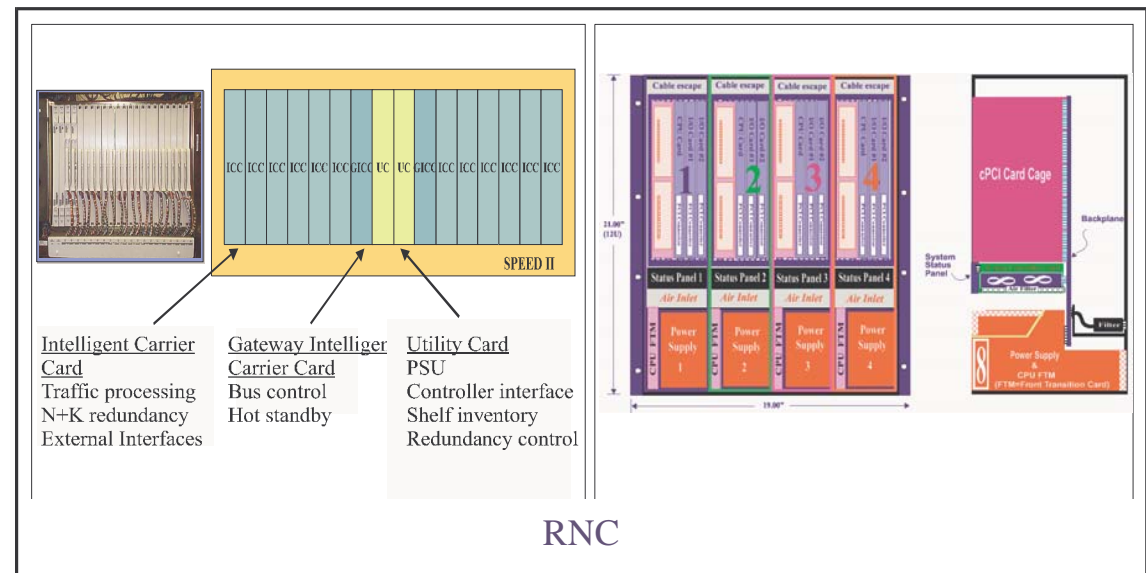
WCDMA Tester Product Requirements

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Requirement I: Network Simulator is not Network Equipment!



BTS

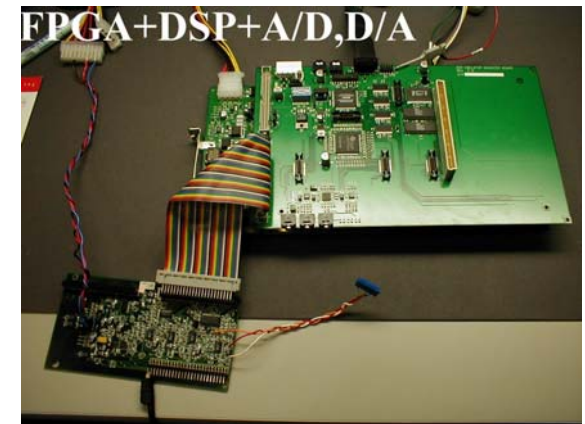
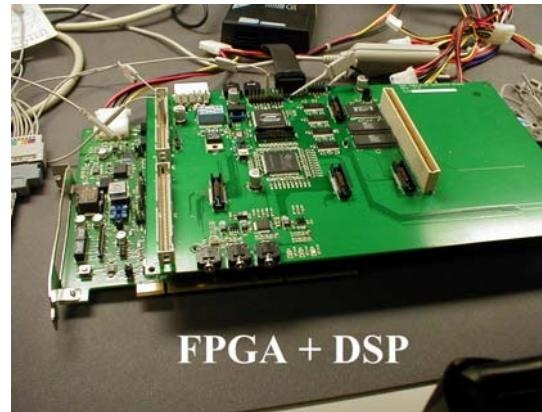
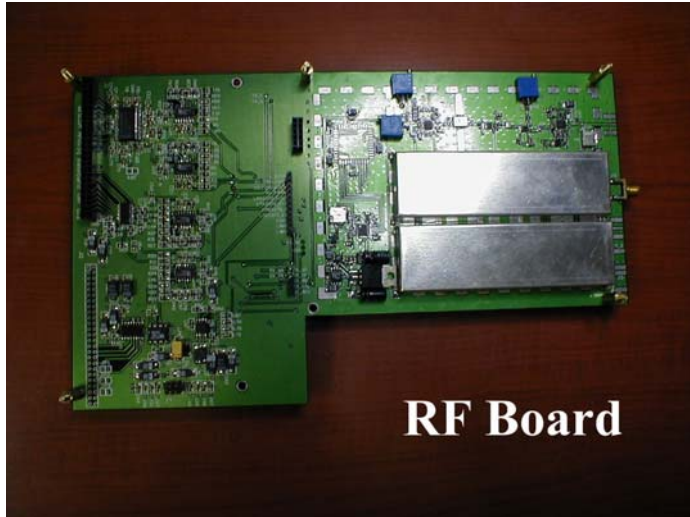


RNC

We can not afford Over-Engineering the product

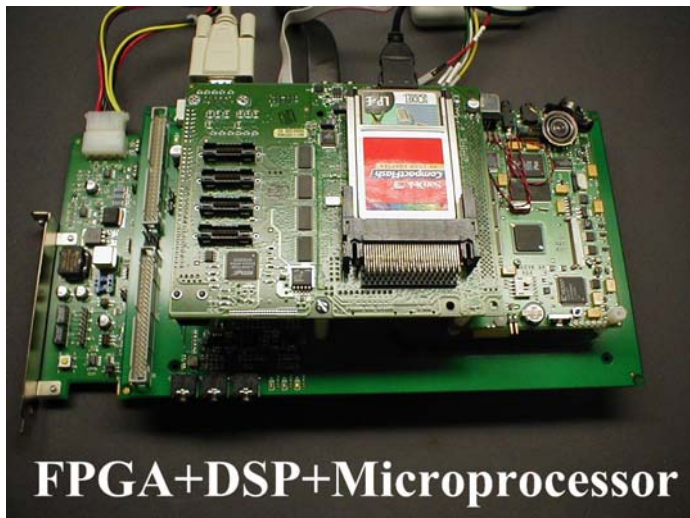
- 1996-2000: WCDMA BTS and RNC Product design
- 80 millions annual investment from Lucent, 16 millions from DoCoMo

Requirement II: Understand 3G mobile terminal Test Criteria

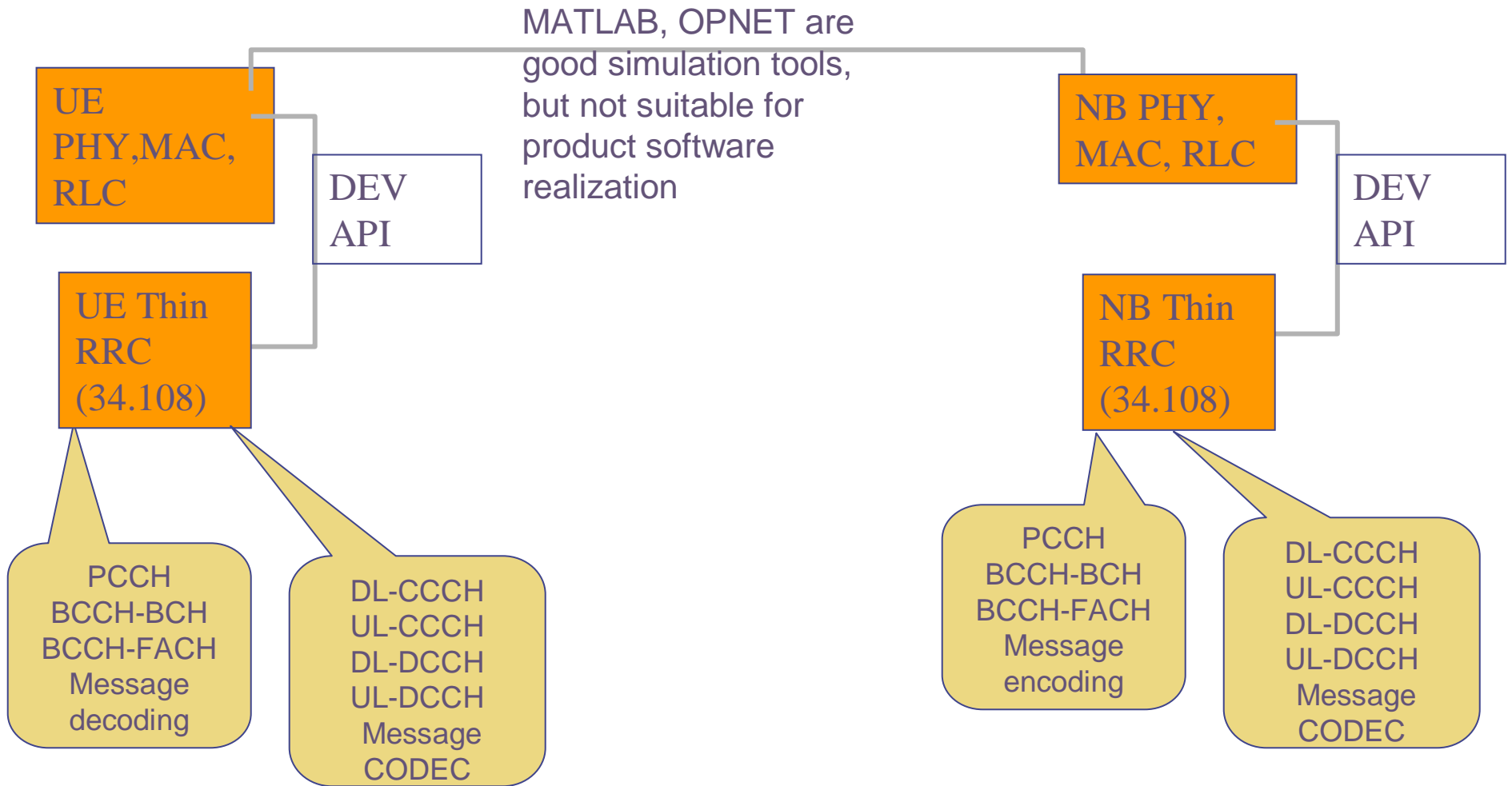


We can not afford test mobile initially

- 2000-2001 of Wiscom Tech: WCDMA BB HW and air interface protocol design
- 10 millions investment from AMD, and Wall Street, 30 staffs
- IPR acquired by INTEL



Requirement III: Network Simulator is much more than a UMTS/WCDMA simulation (Neither MATLAB or OPNET is a suitable product platform)



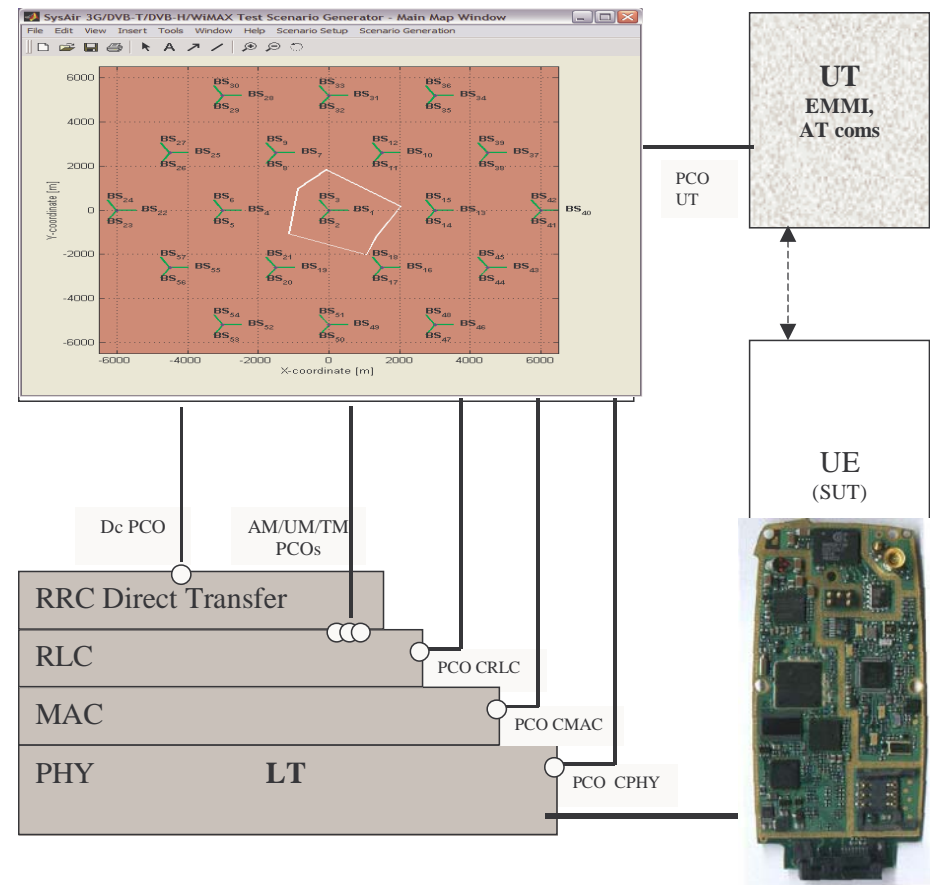
Requirements IV: Understand Customer's needs

Product 1: FTA Tester for
chipset and protocol
design company and
handset manufacturer

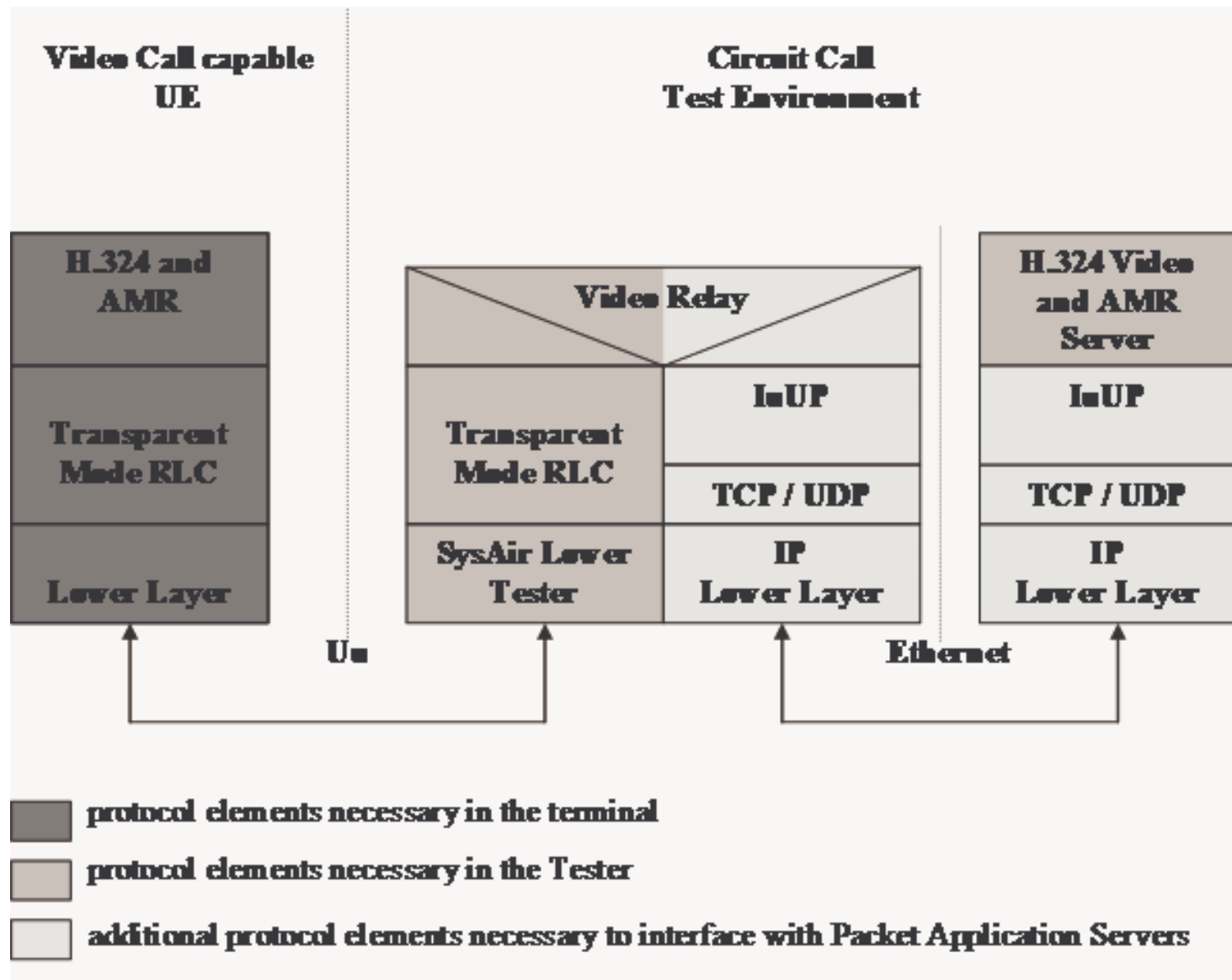
Product 2: Manufacture
Tester for handset
manufacturers

Product 3: Network IOT
Tester for operators and
handset manufacturer

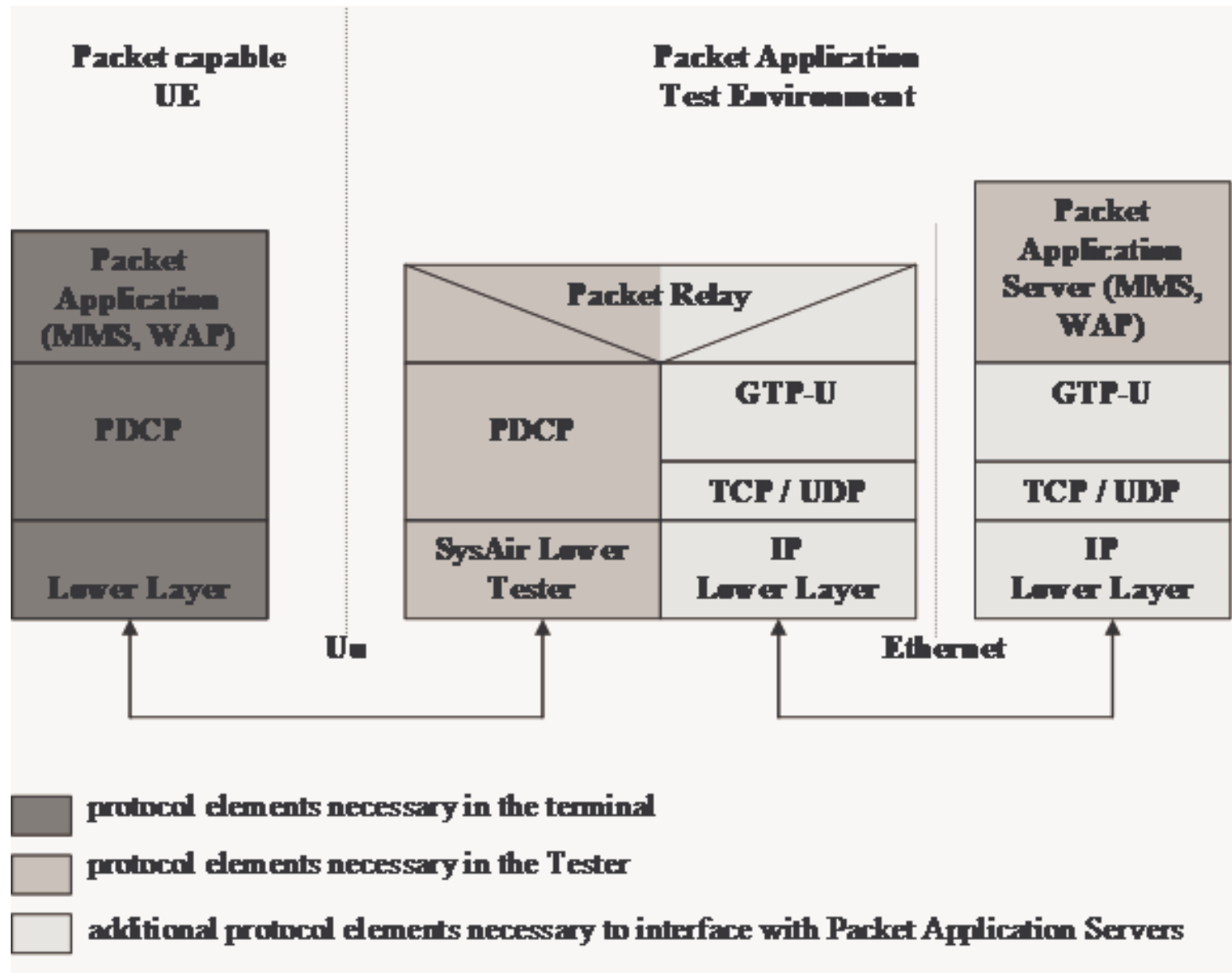
Product 4: Application
IOT Tester for operators,
handset manufacturer, and
ASP



Requirement V: Circuit Switched Application Test



Requirement VI: Packet Switched Application Test

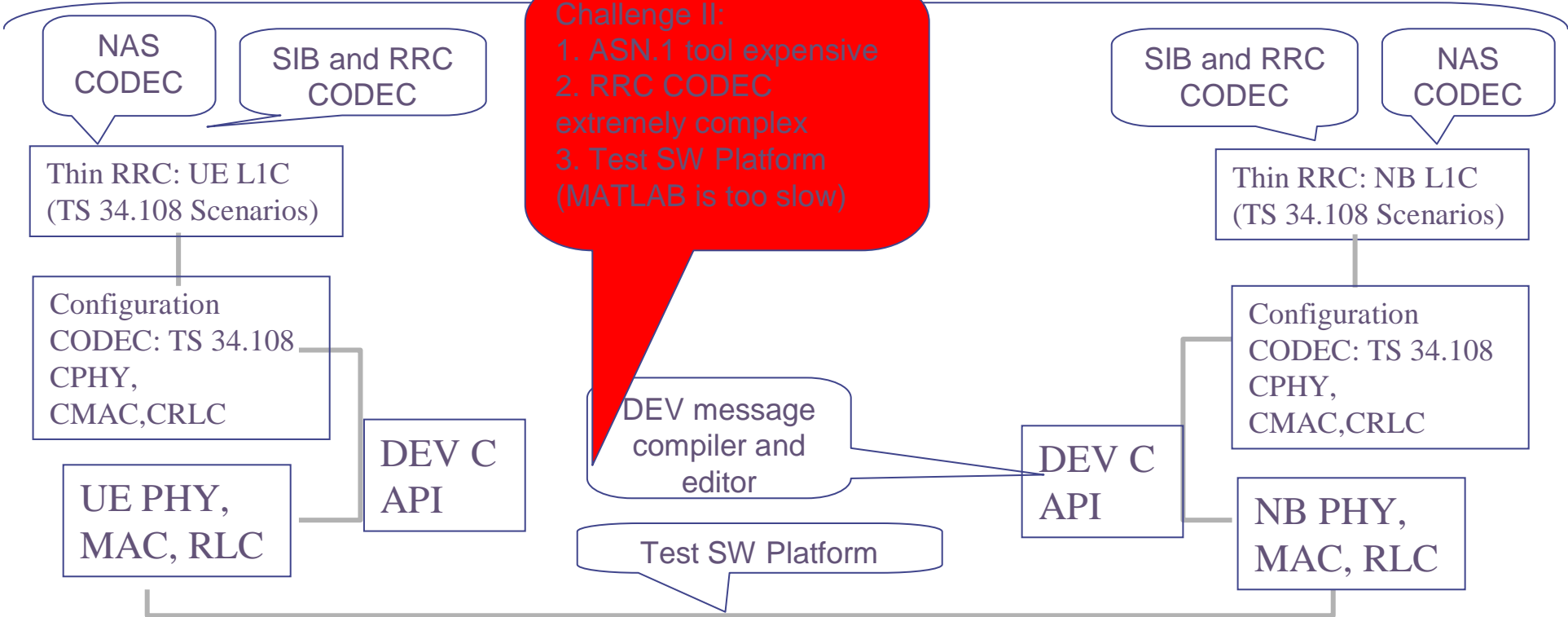
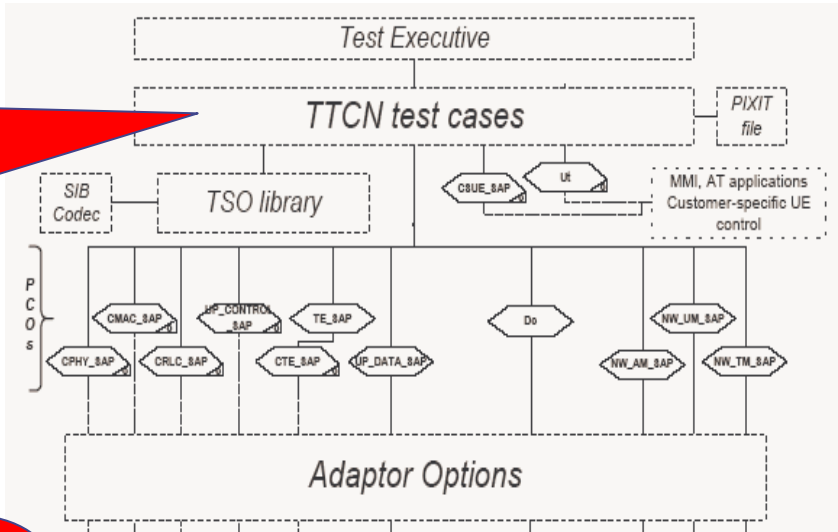


WCDMA Tester Product Challenge for small company

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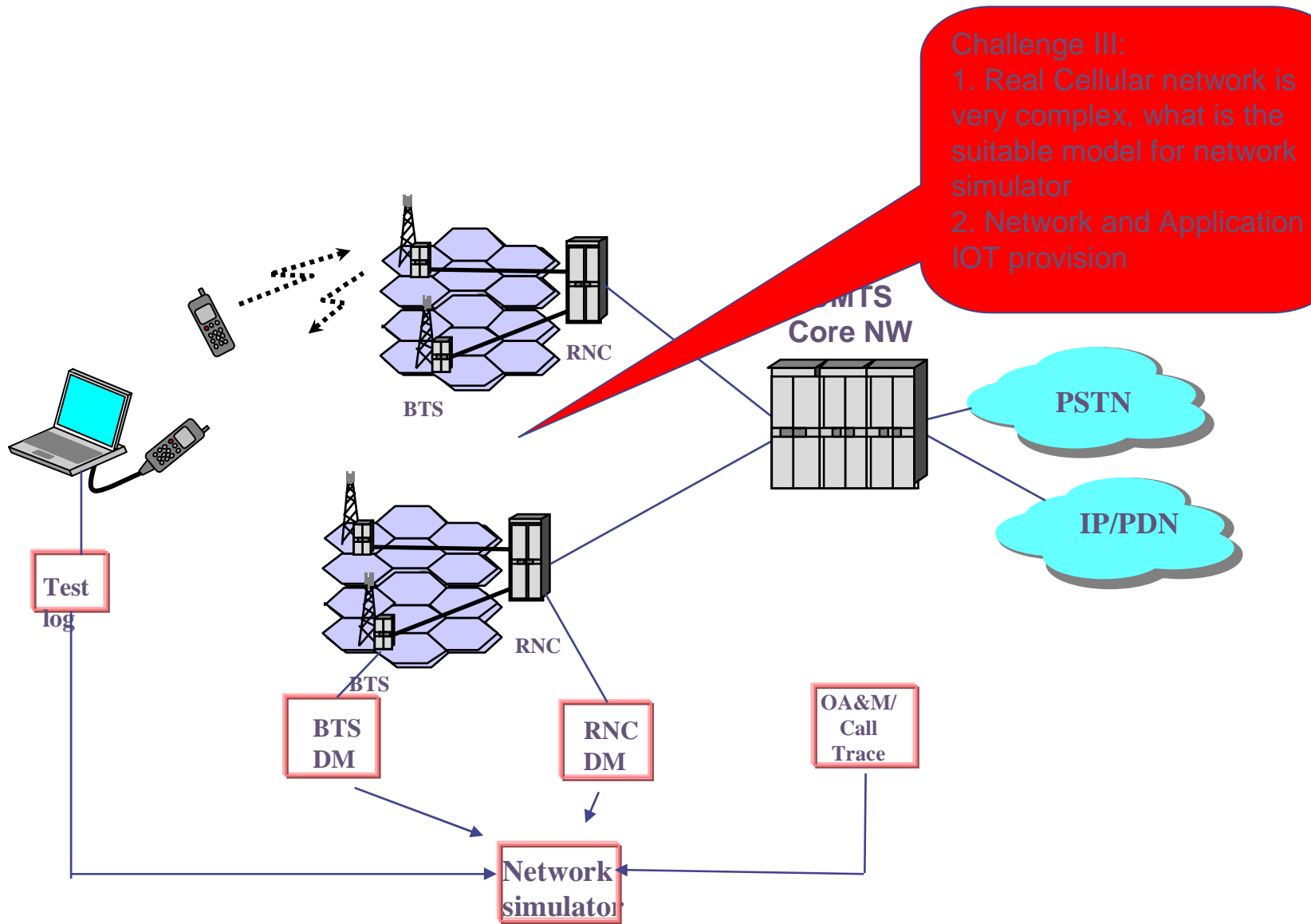
Challenge I:

1. TTCN tool expensive
2. Test mobile expensive
3. Test Tool integration requires more resource than small company can handle



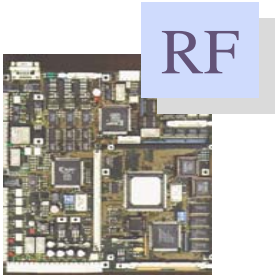
Challenge II:

1. ASN.1 tool expensive
2. RRC CODEC extremely complex
3. Test SW Platform (MATLAB is too slow)



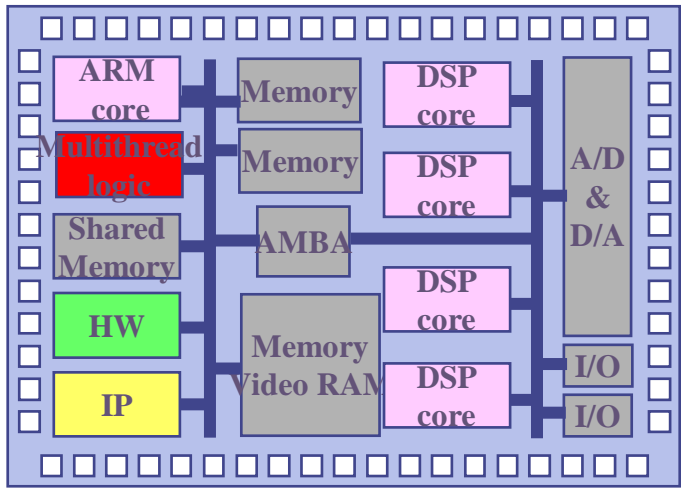
Challenge IV:

1. How to build the HW?
2. FPGA Vs DSP
3. Digital I/Q, Analog I/Q, RF options
4. We can not afford to design ASIC
5. PC and embedded HW communication
6. Embedded HW and RF integration



W-CDMA

HSDPA



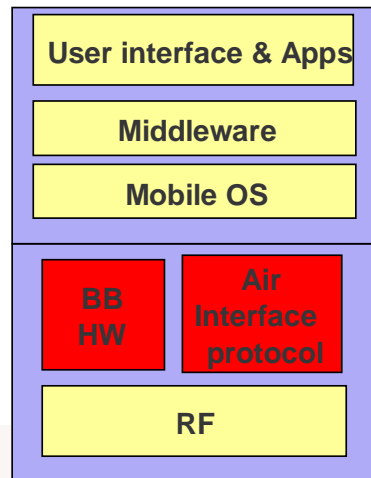
GSM

GPRS

Meet the challenge

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SysAir 2002-present

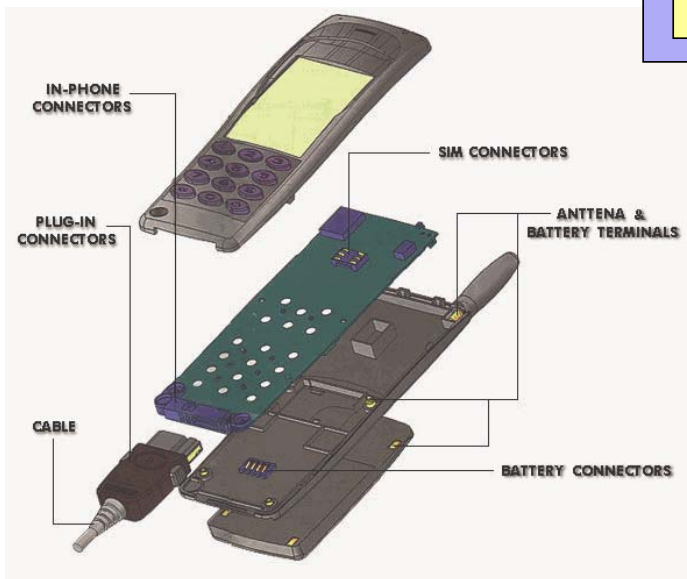


Project 2002: WCDMA
BB HW design from ITRI

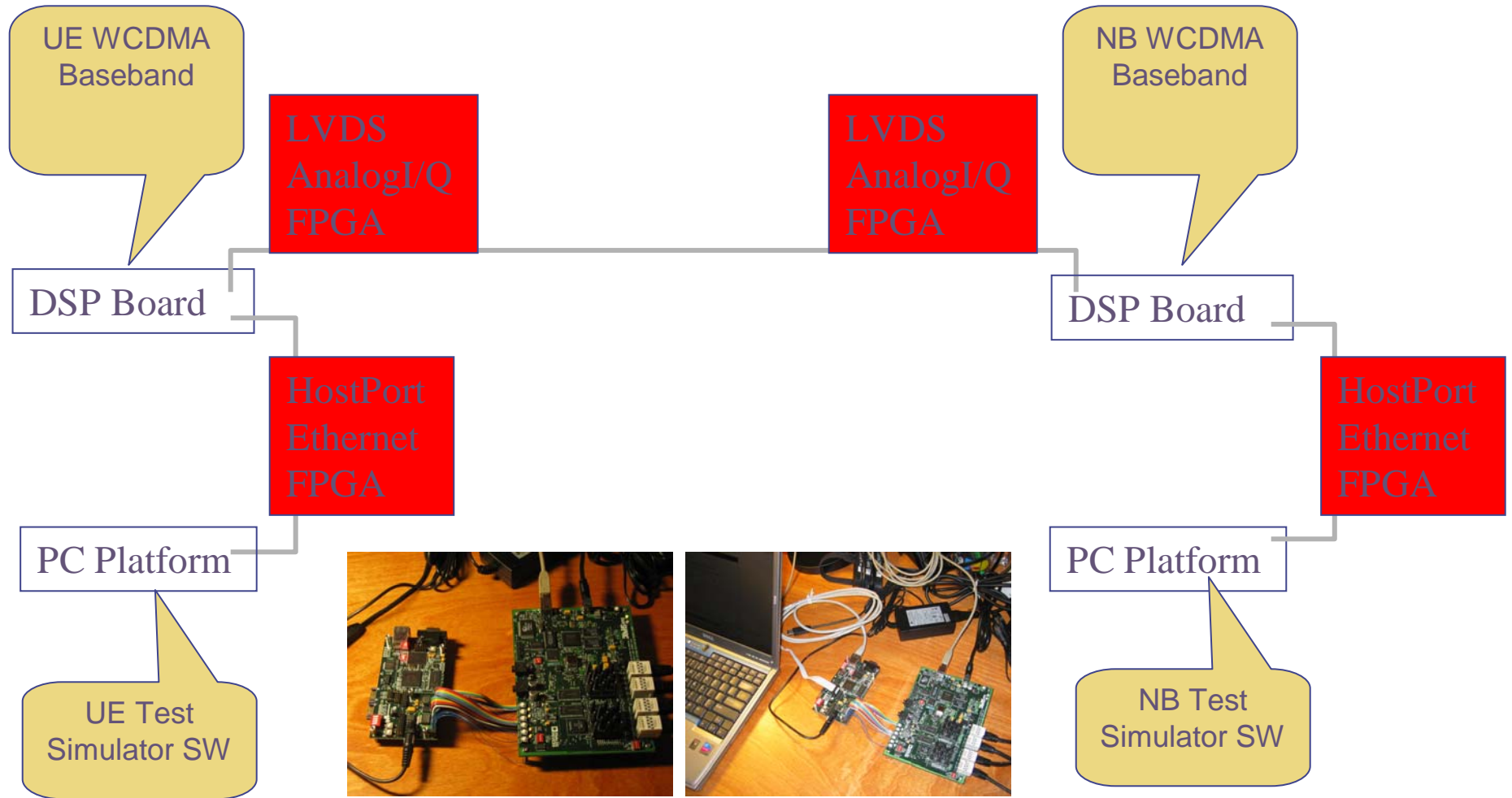
Project 2003: WCDMA
air interface protocol
design from III

Project 2004: WCDMA
Handset Conformance
Tester platform from III

Project 2005: WCDMA
Handset Network
Interoperability Tester for
operators



SysAir HW Design



SysAir Lower Tester SW Platform Architecture

