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**ITU Regional Seminar for the Africa Region on  
Conformance and Interoperability Testing Centres**  
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**Development of a Unified Regional ITTC Solution**

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**Presentation Overview**

- Scope and purpose of a Regional ITTC
- Functional capabilities of an ITTC
- Testing programs for an ITTC
- Advantages of creating a Regional ITTC
- Developing a unified Regional ITTC solution
- Concluding comments



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## Scope and purpose of a Regional ITTC

- Regional Testing Centers should be developed to address Region-specific issues
- Testing programs offered should be developed to address certification practices, technologies implemented and technology trends of the Region
- Experience gained in performing complex networking tests could lead to a unified set of equipment requirements, unified network solutions, and improved QoS/QoE
- Regional Testing Centers could stimulate interest in multi-vendor interoperability testing where particular problems exist
- ITTCs should focus on capacity building and training programs, given the accumulated experience with testing current and evolving technologies in the Region



## Functional capabilities of an ITTC

Depending upon the Regional solution selected, functional capabilities may include:

- Configuring, calibrating, and testing appropriate telecommunications and measurement equipment
- Configuring a model network infrastructure for complex interoperability testing of systems and services
- Automated control systems and testing procedures (testing methods, testing protocols etc.)
- Provisioning of training on testing procedures and new technologies
- Coordination with other ITU conformance and interoperability activities in support of a knowledge database

Source: "Handbook on Testing", ITU-T, 2011





## Testing programs for an ITTC

### - Test objectives for ITTCs

- Conformance testing
  - Prioritized according to Regional technologies supported and network evolution plans
  - Broad enough in scope to cover multiple technologies
  - Complementary to other test labs/certification activities in the Region
- Interoperability testing
  - Complementary to conformance testing
  - Must support complex system/service testing (ITU-T "model network" concept)
  - Results may help resolve conformance issues
- Type approval testing
  - Based on Regional conditions, type approval should be offered as well as conformance and interoperability testing



## Test objectives for ITTCs

### - Interoperability and type approval

- The **root causes** of some perceived interoperability issues do not arise from a failure to conform to service/ system standards, but due to some equipment components operating outside specified norms
- Independent verification that equipment will perform adequately within acceptable levels of safety, availability, and reliability - and function within the published specifications of the manufacturer and/or relevant mandatory or voluntary industry standards

Type Approval testing is warranted when:\*

- there is user dissatisfaction and disorder in the marketplace
- there is increased incidence of interference in all services
- there are public concerns about health risks (e.g., from non-ionizing EM radiation exposure)
- there is suspicion of dumping of sub-standard products in the marketplace which have failed testing in other countries
- no available test labs in-country or region with acceptable service performance, scope and costs

\*Source: McCrum, S3-4, ITU Workshop, Ghana (July 2011)





## Testing programs for an ITTC

### - Type approval

- Inclusion of Type Approval as part of a Regional Test Center, if warranted, significantly modifies the objectives and mandates of the Regional ITTC solution
- A different and complementary set of labs and lab equipment is required to perform this function
- A cost-benefit analysis would be necessary to determine whether the potential benefits (e.g., Regional reduction in faulty network equipment, elimination of some interoperability issues) warrant building and operating the type approval lab

#### Type Approval Lab Sub-units\*

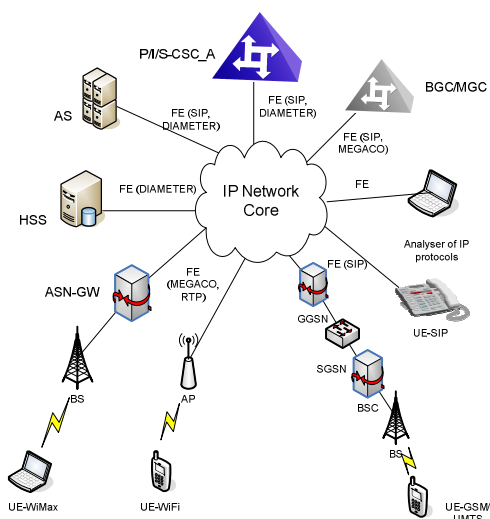
- Calibration lab
- Wireless test lab
- Wireline test lab
- EM Shielded room
- Anechoic chamber
- EMC test lab
- SAR test systems
- Environmental chamber
- Open Area Test Site (OATS)

\*Source: McCrum, S3-4, ITU Workshop, Ghana (July 2011)



## Testing programs for an ITTC

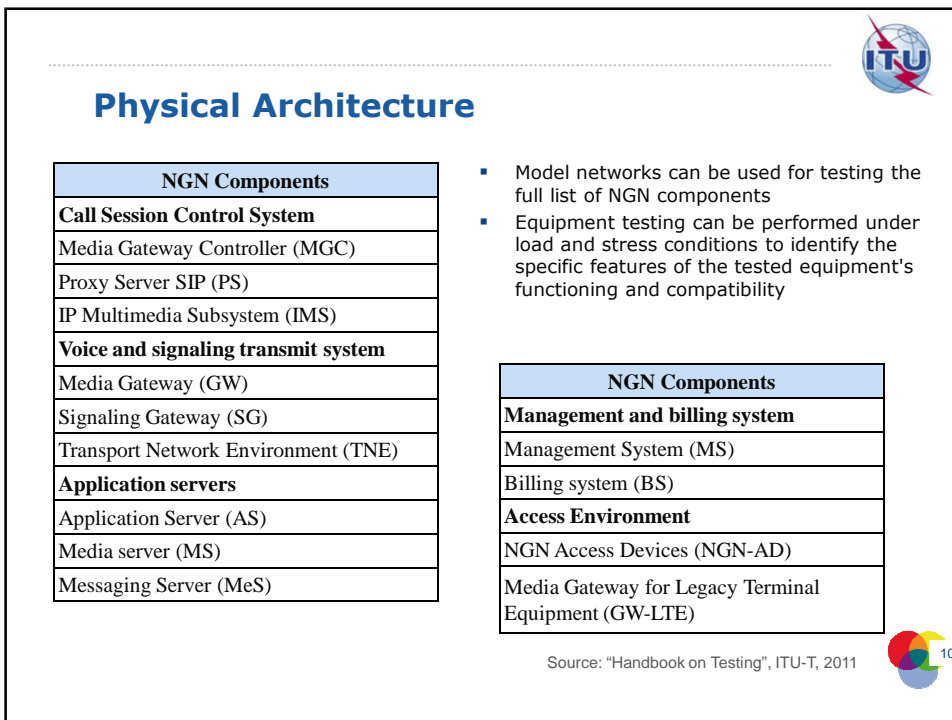
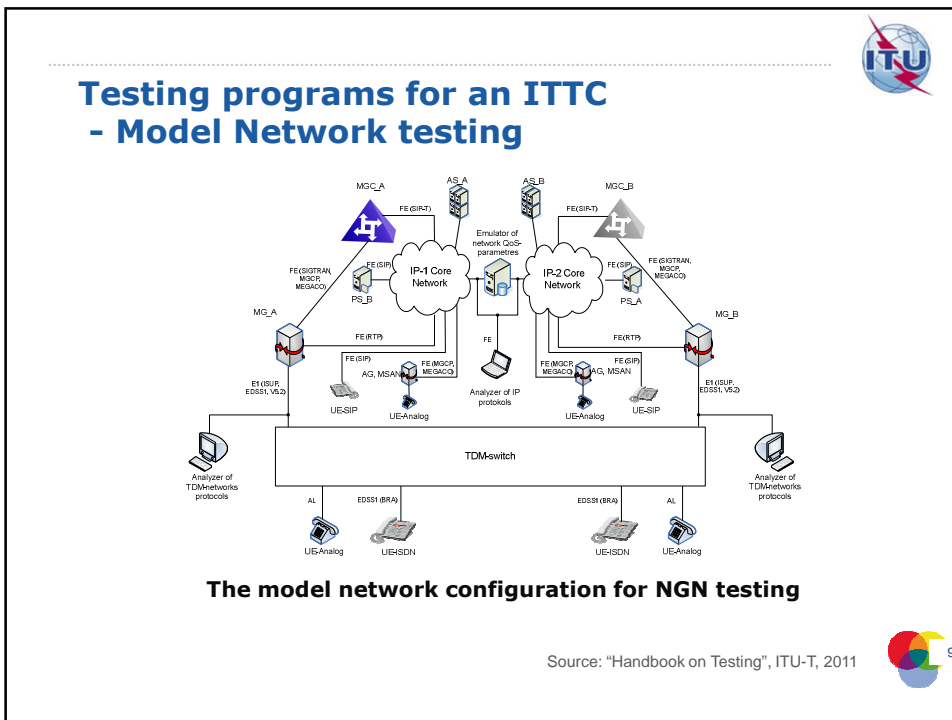
### - Model Network testing




The model network configuration for terminal testing

Source: "Handbook on Testing", ITU-T, 2011









## Component and Network Testing

Phase 1 NGN Component Testing	Phase 2 NGN Network Testing
1.1 Functional testing	2.1 Functional testing
1.2 Load and Stress testing	2.2 Interconnect testing
1.3 Conformance testing	2.3 Service testing
	2.4 End-to-End testing
	2.5 QoS testing
	2.6 Mobility & Roaming testing

**Testing Process**


- The testing process should incorporate two main test phases
  - Phase 1: NGN Component Testing (EUT-Equipment Under Test)
  - Phase 2: Comprehensive NGN solutions and services testing (Network Under Test – NUT)

Source: "Handbook on Testing", ITU-T, 2011

## Advantages of creating a Regional ITTC

- A Regional Testing Center has the primary advantage of size (if the alternative is several smaller unassociated labs throughout the Region)
- Economies of scale permit focus and specialization on processes and tools
- Capacity building efforts benefit from concentration of experts with specialized equipment testing new applications and services at a single location
- A Regional Center provides better control over the scope of the testing program and process consistency across all testing (e.g., test bed improvements, code updates, release management)





## Developing a unified Regional ITTC solution - Phased Approach

- Region-specific data (funding, expertise, certification experience, network services deployed) is necessary to determine the test program, initial facility size, and scope of a Regional ITTC
- Without specific knowledge for a Region, it is prudent to design the ITTC facility according to a Phased Approach
- An assessment of current and planned network services and technologies must be completed to prioritize the construction of labs and equipment for type approval, conformance and interoperability testing



## Developing a unified Regional ITTC solution - Phased Approach

- Phases can be judged on the basis of factors such as:
  - Technologies currently in use (market penetration, service maturity)
    - It is likely that legacy services in use will not require as much conformance and interoperability testing, unless there are issues with equipment quality and performance. Type Approval testing may be required in these cases – requiring additional ITTC facilities.
  - New and planned technologies and services
  - Network interconnections for new systems
- It is likely that wireless services and broadband access will be high priorities in most Regions
- Conformance testing can be performed on existing services. Conformance and Interoperability testing of equipment and services will be most valuable in environments with multi-vendor equipment and newly deployed systems and services.





## Developing a unified Regional ITTC solution

### - Type Approval Testing Facilities

- Modular design enables flexibility for initial lab scope, expansion decisions, and costs
- Test lab modules should include:
  - Test labs (e.g., Calibration lab, Wireless test lab, Wireline test lab, EM Shielded room, Anechoic chamber, EMC test lab, SAR test systems, Environmental chamber, Open Area Test Site (OATS))
  - Equipment certification, inspection, maintenance
  - Business operations unit
    - Reception
    - Financial operations and billing systems
    - Training programs
    - Data base/Document filing system
    - Shipping and receiving



## Developing a unified Regional ITTC solution

### - Conformance/Interoperability Testing Facilities

- "Model Network" test lab needs to be flexible to address numerous test architectures
- Conformance and interoperability scenarios require a variety of equipment in order to be useful in testing varied technologies
- The Model Network Test lab requires:
  - Media Gateway Controllers (MGC), Proxy Servers SIP (PS), IP Multimedia Subsystem (IMS), Media Gateways (GW), Signaling Gateways (SG), Transport Network Environment (TNE), Application Servers (AS), Media servers (MS), Messaging Servers (MeS), Management System (MS), Billing system (BS), NGN Access Devices (NGN-AD), Media Gateway for Legacy Terminal Equipment (GW-LTE)







## Concluding Comments

- Regional Testing Centers should be developed to address Region-specific issues
- ITTCs should support Conformance testing and Interoperability testing – utilizing “model network” test beds for system test scenarios
- Type approval labs should be added to ITTC plans, if warranted. Lab unit modularity allows some flexibility in building out these facilities.
- A Regional ITTC has the advantage of economies of scale, concentrating expertise, supporting more test scenarios, better control of testing programs, resources and experts available for capacity building and training
- Region-specific data (funding, expertise, certification experience, network services deployed) is necessary to determine the test program, initial facility size and scope



*Thank You!*

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