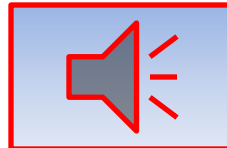ASREN
Arab States Research and Education Network

IPv6 & NREN

Internet2 Middle East Regional Interest Group Meeting
Amman Jordan 13 Dec. 2011

Alaa AL-Din Al-Radhi
IPv6, Cyber Security & Emerging Technologies:
Consultant Engineer, Practitioner, Networker & Trainer
IPv6 Forum Jordan Chapter President
alradhi2000@yahoo.ca , alaalradhi@hotmail.com
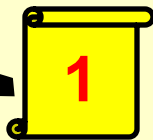+ 962 796347600
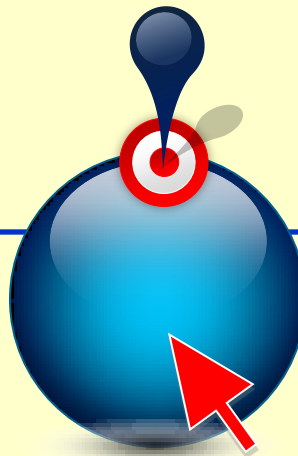
AGENDA

Wrap-
UP & The
Way Forward

4 IPv6 Road-Map

3 IPv6 & NREN

2 What's Next ? IPv6 Solution

1 Current Internet & Net Challanges

agenda

AGENDA

agenda

1 Current Internet Barriers / Challanges

4.3 Billion IPv4 addresses are running out

ICANN IPv4 Addresses

IP IP IP

The end of IPv4 Era

ICANN

ARIN
American Registry for Internet Numbers
LACNIC
AfriNIC
APNIC
RIPE NCC

February 2011

6 month supply or less

ISPs, Companies, etc.

IANA
Unallocated IPv4 Pool

Jan 01, 1983 to Feb 03, 2011

R.I.P.

Current IPv4 Cyber Threats Briefings

Threats Comes From:

1

2

Major Flaws Of Legacy Internet Backbone Design: IPv4

Ignorance of Adopting the ONLY Ahead Solution: IPv6

WARNING

CHALLENGES AHEAD

Result = Accumulated Attacks

NAT

Outdated Security Design

P-2-P

End-End Connections

Mobility
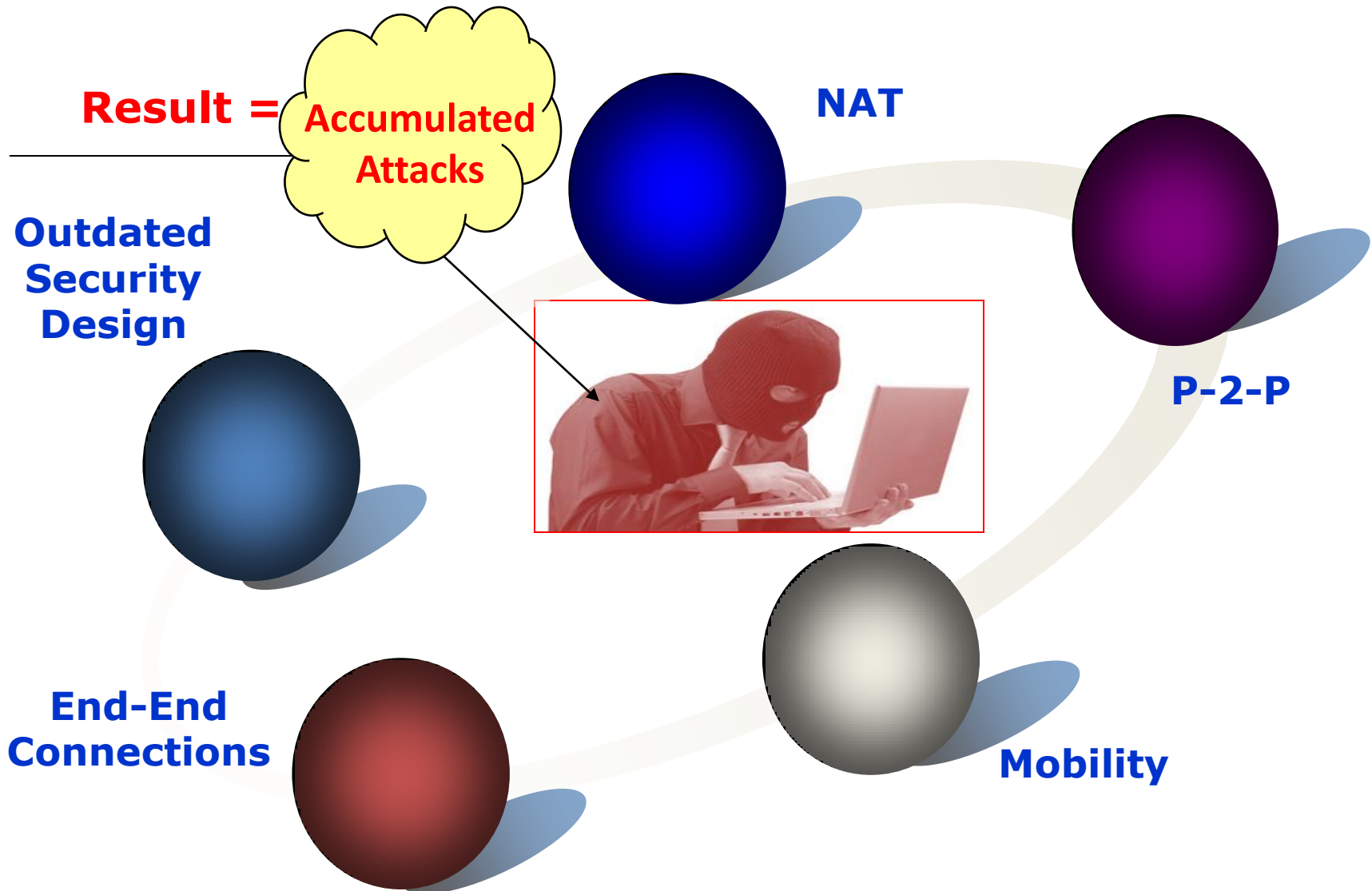
AGENDA

agenda
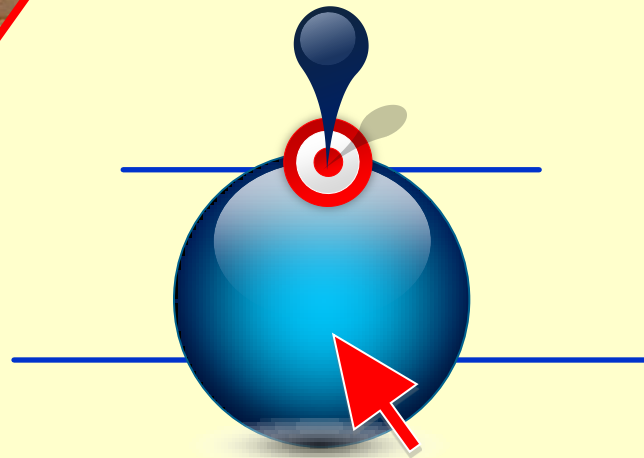
2 What's Next ? IPv6 Solution

Key IPv6 Features

- Improved Network Performance
- Integrated Security (IPSec)
- Larger Address Space
- Standardized Quality of Service (QoS)
- Device auto-configuration
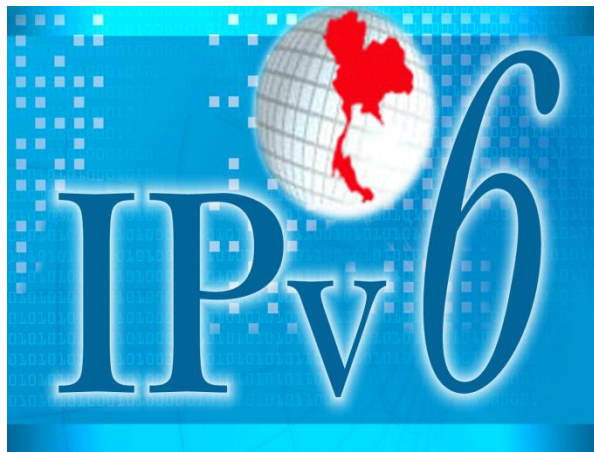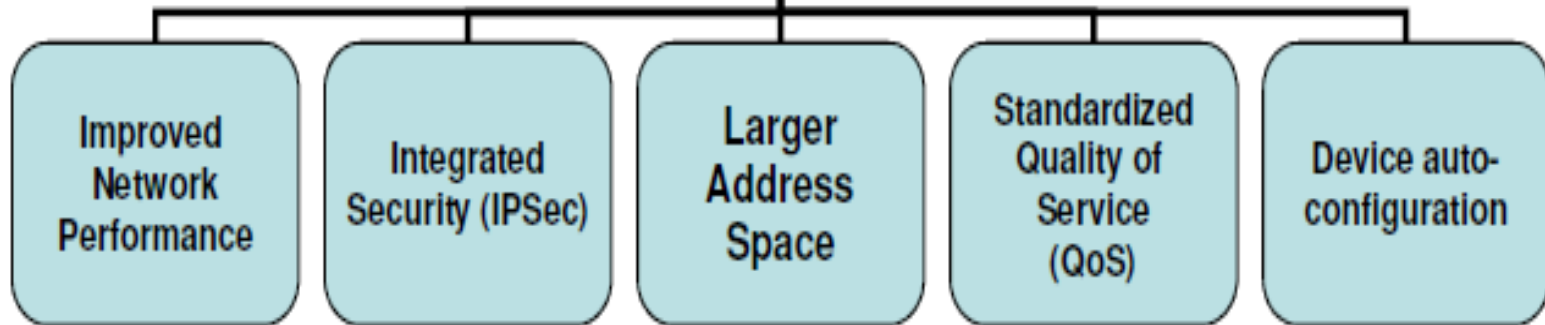
- mandatory IPSec
  - ✓ Secure Business

- better audio/video transmission
  - ✓ Improve Business QoS

- variable header size
  - ✓ Improve business performance

- 128 bit address
  - ✓ Business continuity

- device "plug and play"
  - ✓ Business flexibility/dynamic
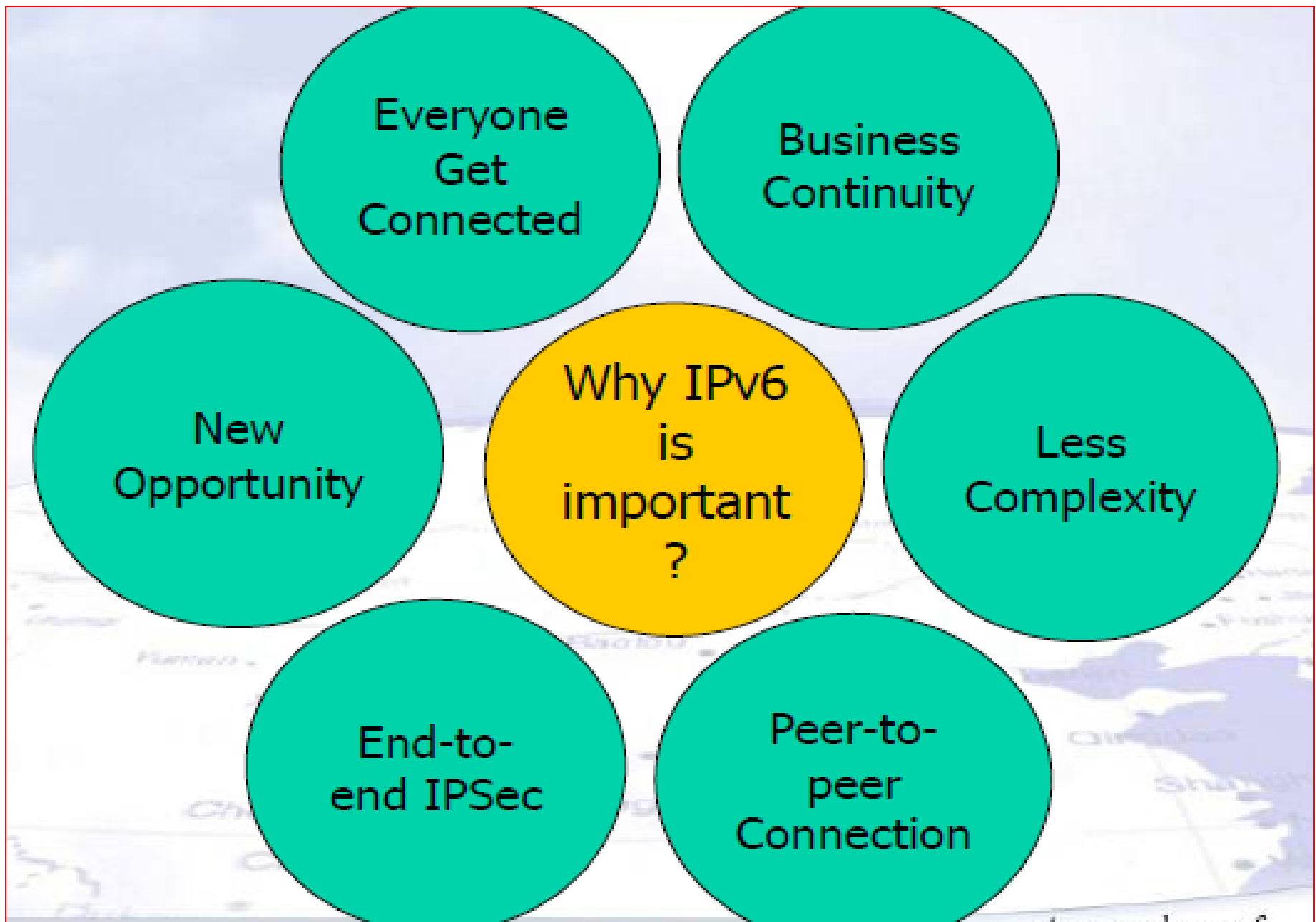
- Devices always On ⬆
- Number of devices ⬆
- Number of addresses ⬆
- Need for globally routable addresses ⬆
- Security ⬆
- Mobility (& Mobile worker/Smart phones) ⬆
- Wireless (Future Internet is largely wireless/mobile) ⬆
- End user Cost ⬇
- Operating Cost ⬇
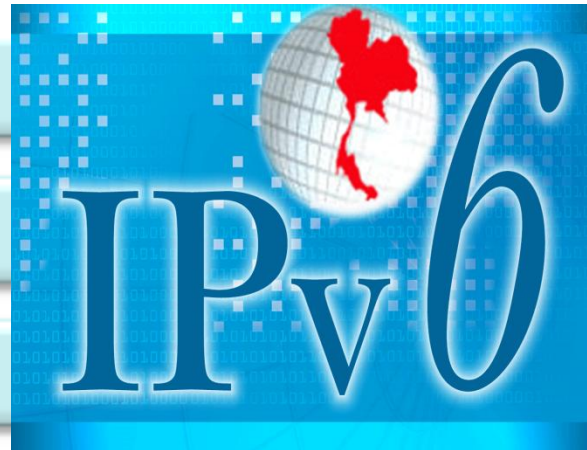
What is Needed:
IPv6 End-to-End Secure Communications

IPv4

Site-to-Site secure communications

Private address segments | Global address segments | Private address segments

Secure Transmission

Branch A — IPsec Node **R** — IPv4 Internet — **R** IPsec Node — Branch B

NAT   **NAT**

Low security in the LAN segments

Low interoperability between deferent vendors

Global address segments

IPv6

End-to-End secure communications

Secure Transmission

Branch A — **R** — IPv6 Internet — **R** — Branch B

Secure Transmission

R

End-to-End secure communications

Easy to set up new connection

Partner company

AGENDA

agenda

3 IPv6 & NREN

Context

Low Carbon Economy

E-Learn

3D Internet

NGN

Social Networks & Future Media

User Centric

SOA

Smart Grids

Sensor Networks

RFID

Web

Cloud Computing

ICT & Climate Changes

E-health for Ageing

Web 2.0

Semantic Web

Software-Aware Applications

NREN

Technology - Enhanced Learning

IPv6 Enabled & Ready

- Research & Innovation

- Enhancing e-skills

- ICT 4 Social Change

- International

- Digital Single Market

- Interoperability & Standards

- Trust & Security

- Very Fast Internet

IPv6 Cluster

IPv6 Cluster

NRENs Visions for IPV6-Ready

- Although there are IPv6 migration costs & *NO* apparent functional improvements for the end-user, however this vision needs to be changed
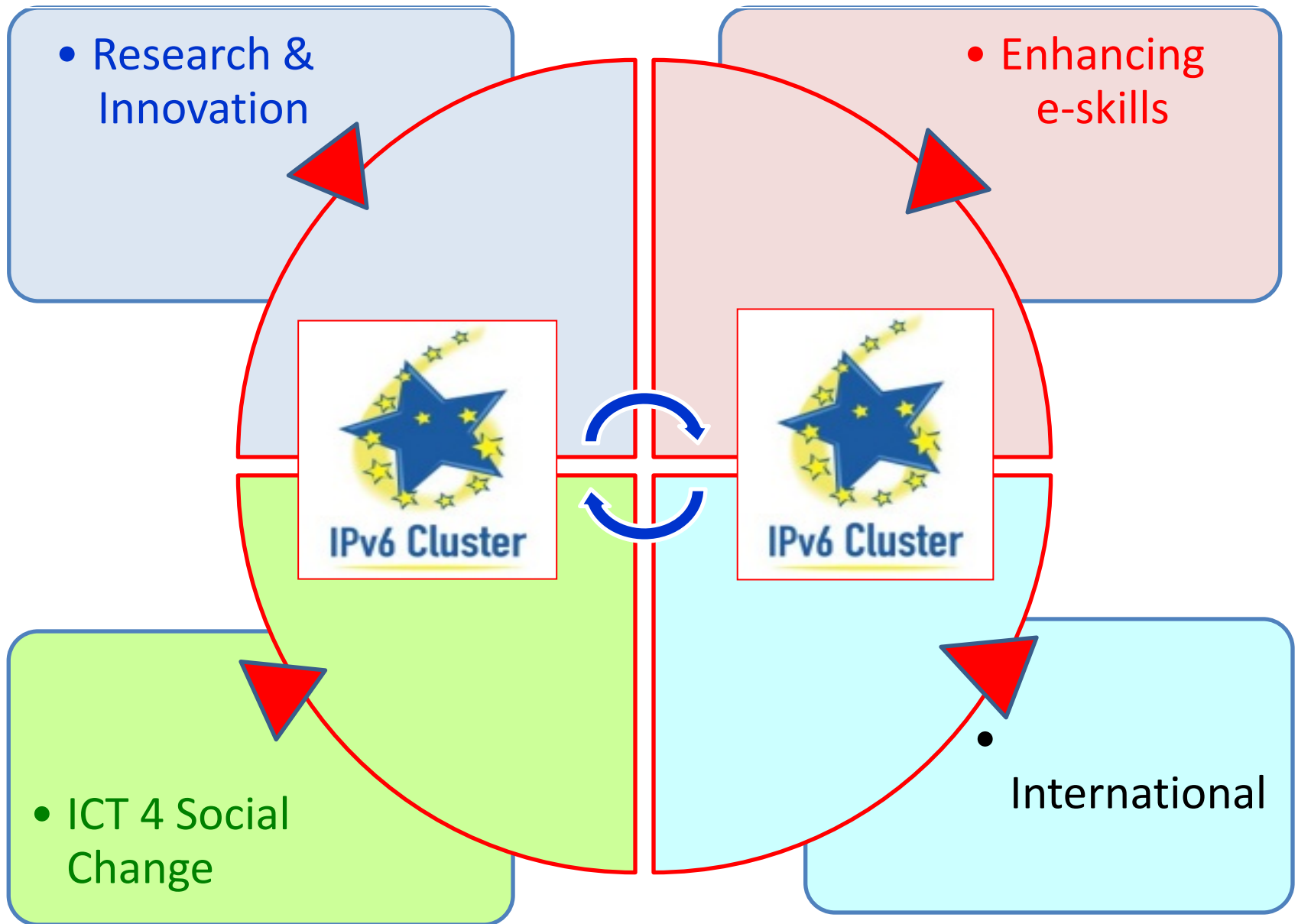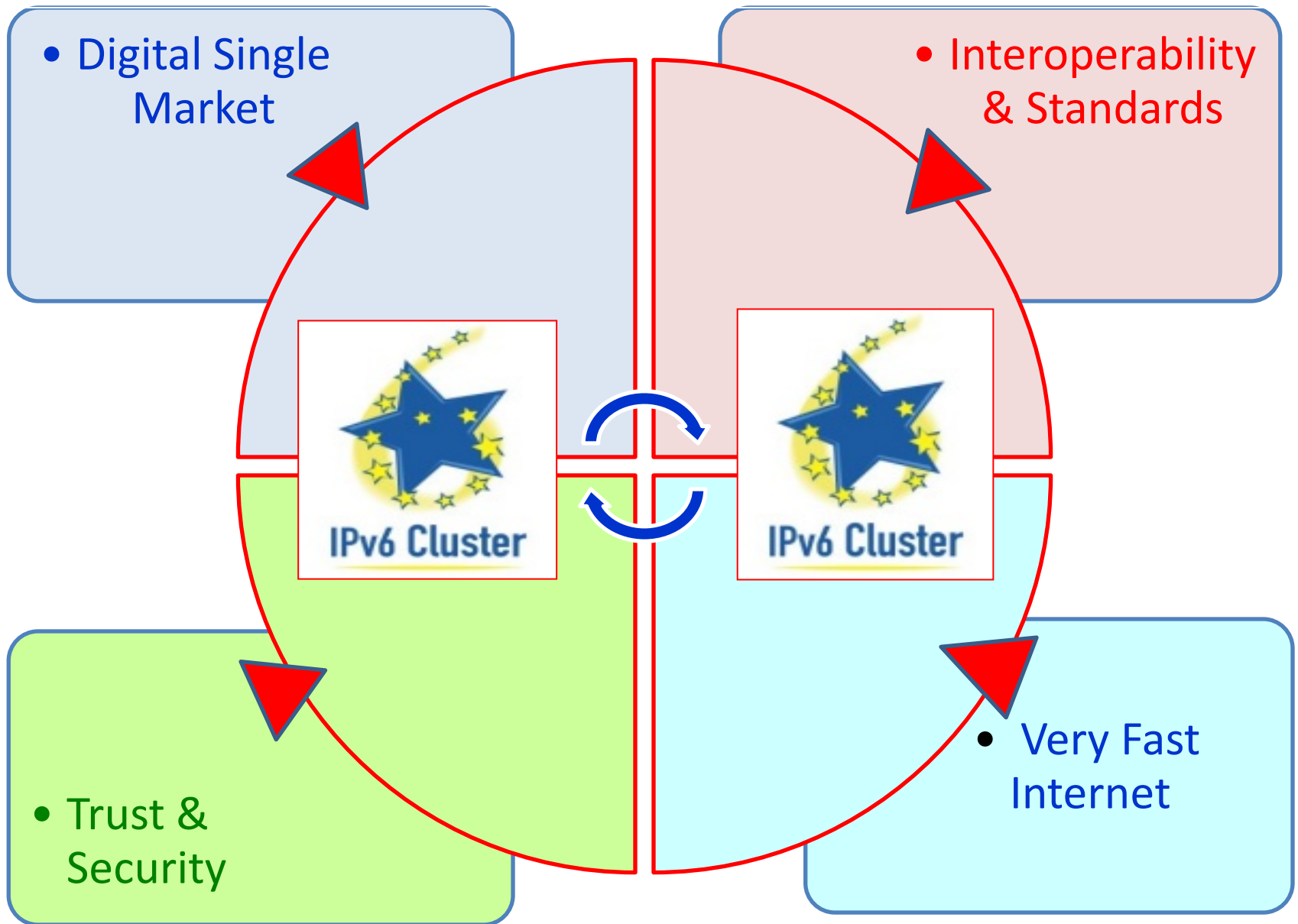- There is a risk that existing IPv4 hosts will become Un-reachable from hosts that only have IPv6 addresses.
- CERT Teams & Performance Enhancement Response Teams
- To give advisory role on National IT / Education Policies
- Services can be developed better jointly
- More Collaboration between NRENs & commercial ISPs
- Involvement of stakeholders is essential with central Gov. roles
- Make use of IP Shared Traffic
- Bandwidth Management and Optimization
- Sharing External Connections to reduce costs

AGENDA

agenda
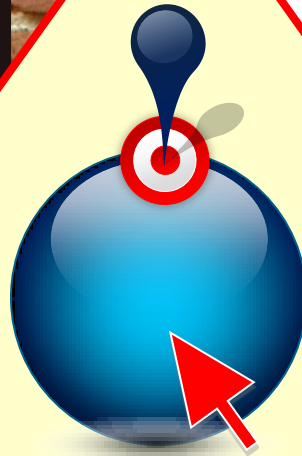
4 IPv6 Road-Map
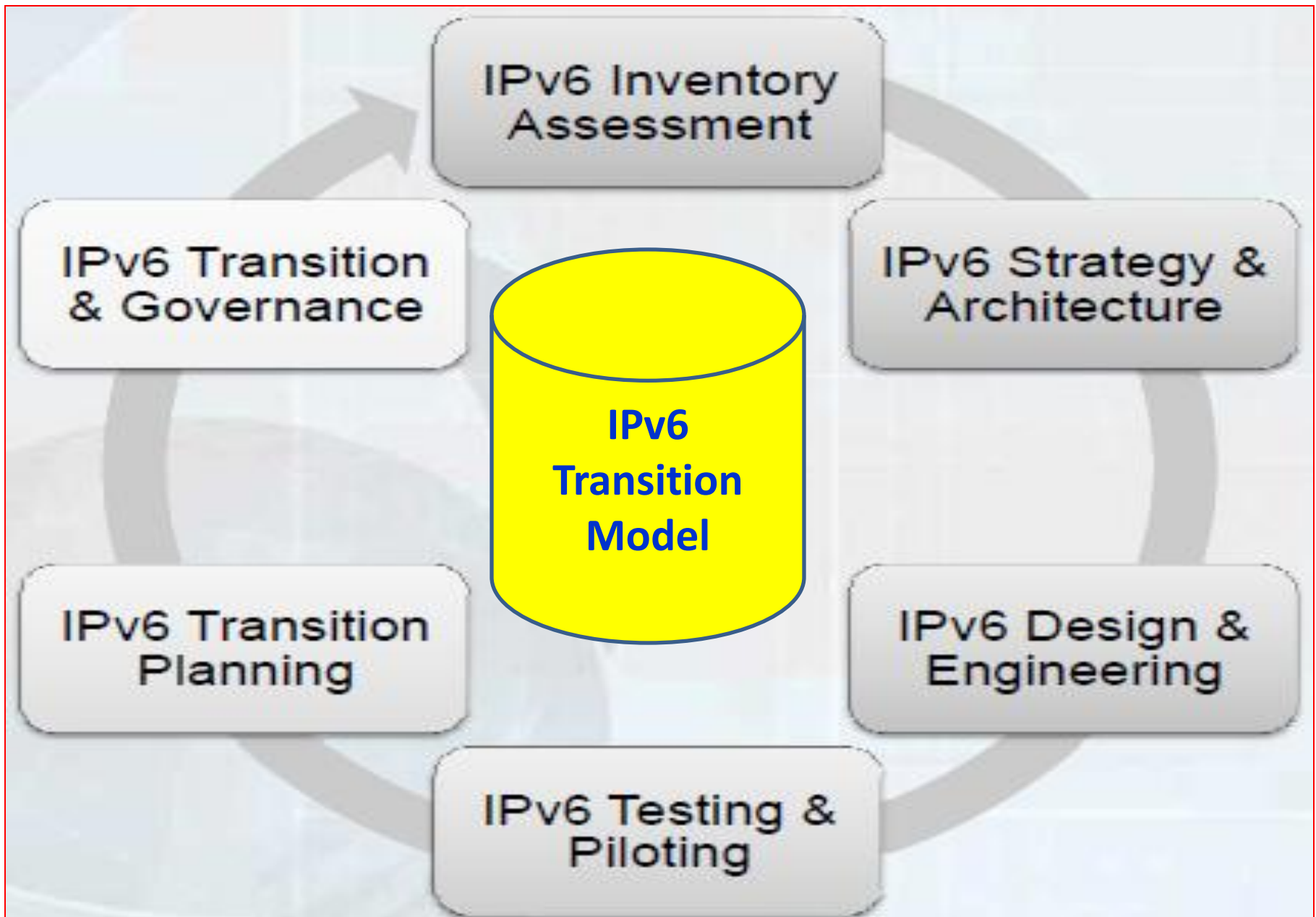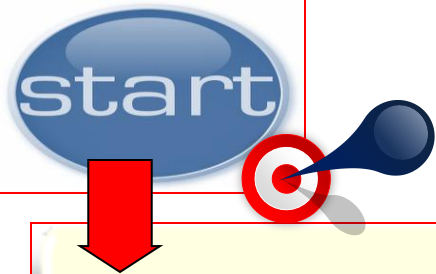
Review of existing network infrastructure and application architecture

Design of new network infrastructure, application architecture, network security, administration, operation and support

Implementation **approach** and **roadmap**

Best practices for implementation and on-going network management

Phase	Description
High-level Design and Proof of Concept Phase	• **Test** new features and interoperability
Low-level Design Phase	• Develop addressing schema, naming convention, physical connectivity and logical topology
Preparation Phase	• Prepare new segments, core routers and systems
Pilot Phase	• Configure and **verify**
Deployment Phase	• Deploy to production
Operation and Optimisation Phase	• **Continuously** monitor, trouble-shoot and optimise

A 2×3 priority matrix plotting Perceived Value (H, M, L) against Cost Estimate (L, M, H):

- **A — External Services**: WWW, DNS, Email, Transit/Peering, Backbone, IX. Nodes < 1K? Tiered Deploy? Tier Criteria.
- **B — Connectivity Expansion**: Access Networks. Nodes <10K?
- **C — Internal Use & All IPv6**: Internal Services, Database, Desktop H/W, S/W. Nodes < 10M?

Priority ?

Perceived Value

Cost Estimate

AGENDA

Wrap-UP & The Way Forward

Categories of Stakeholders	IPv6 Adoption			IPv4 Extension
	Pull Factors		Push Factors	
End Users				
Enterprise	Create Initial IPv6 Demand	Drive Competency	Raise Awareness	
Government Agencies				
Content/ Application Providers				
Network Providers	Create IPv6 Supply			Manage IPv4 Exhaustion
Hardware/ Software Vendors			Ensure IPv6/IPv4 Performance Equity	

Some Arab Region
IPv6 & NREN
Status-Quo Highlights

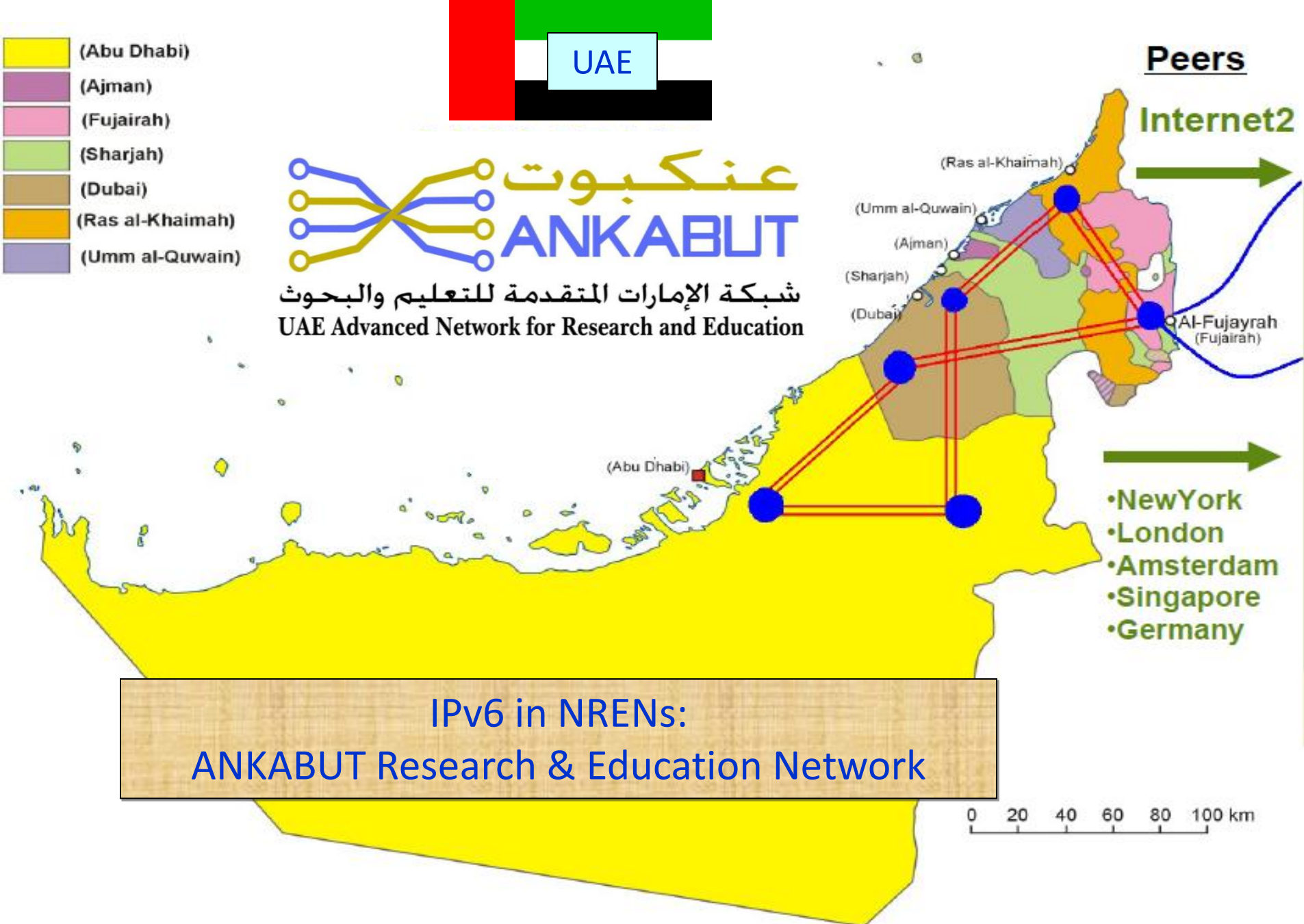| Country	IPv6 Key Milestones
UAE	✓ *2001-2008:* 3, IPv6 Summits ✓ *2005:* Establishment of the UAE Task Force ✓ Setup of IPv6 Lab www.ipv6.ae , Lab.ipv6.ae
KSA	✓ *2008:* IPv6 Task Force Established www.ipv6.org.sa ✓ *2008-2011:* 11, Meetings + Workshop + Strategy ✓ Setup of IPv6 Test Lab
Egypt	✓ IPv6 Task Force Established www.ipv6tf.org.eg ✓ IPv6 Forum / Egypt Chapter Established ✓ Setup of IPv6 Research Lab
Jordan	✓ *2010:* IPv6 Forum / Jordan Chapter Established ✓ *2010:* 1st IPv6 Workshop held (co-located NGMAST) ✓ *2010:* IPv6 Task Force Established www.ipv6.jo ✓ *2011:* 1st RIPE-NCC IPv6 Routing Workshop Conducted
Iraq	✓ *2010:* IPv6 Forum / Iraq Ch. & Task Force: Under construction ✓ *2011:* 1st IPv6 Day Multi-Stakeholders Seminar Conducted ✓ 2011: IPv6 Council Established (New)
Lebanon	✓ *2010:* IPv6 Forum / Lebanon Chapter Established
Yemen	✓ *2010:* 1st ITU IPv6 Technical Training Conducted www.Yemen.net.ye
Sudan	✓ *2010:* 1st ITU IPv6 Technical Training Conducted www.ntc.gov.sd

Legend:
- (Abu Dhabi)
- (Ajman)
- (Fujairah)
- (Sharjah)
- (Dubai)
- (Ras al-Khaimah)
- (Umm al-Quwain)

UAE

عنكبوت
ANKABUT
شبكة الإمارات المتقدمة للتعليم والبحوث
UAE Advanced Network for Research and Education

Peers

Internet2

- New York
- London
- Amsterdam
- Singapore
- Germany
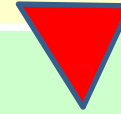
IPv6 in NRENs:
ANKABUT Research & Education Network

www.kustar.ac.ae/ankabut/

Middle East IPv6 Current Challenges:

1

WARNING

CHALLENGES AHEAD

- ❖ LOW Awareness Profile & High Uncertainty
- ❖ TRIPPED Government IPv6 Action & Intervention
- ❖ Reluctant Policy Settings by Regulators
- ❖ NO IPv6 Deployment in The Public sector
- ❖ Reluctant ISPs.
- ❖ NO IPv6 Curriculum in The Higher Education
- ❖ RARE IPv6 Topics & Agendas in Most ICT Meetings
- ❖ NO Regional Contents Providers to boost IPv6
- ❖ VERY LOW IPv6 Skills & Expertise even for the network engineers
- ❖ Difficulty in obtaining local IPv6 data (plans, work Progress, etc)
- ❖ Big Gap in Knowing & Doing IPv6. Gap Analysis is essential
- ❖ NO *"Ahead of the Game"* Vision. Instead: *"Wait & See"* vision.
- ❖ NOT that real customer awareness of demands
- ❖ NO government enforcements & Investments = Push is limited

Middle East IPv6 Current Challenges:

WARNING

CHALLENGES AHEAD

2

❖ NO "Business Case & Models" addressing by ISPs regarding scalability & future Internet growth

❖ Limited Broadband infrastructures hurdle the IPv6 acceleration.

❖ "Ready-Made solutions" is a Traditional Mandate of to avoid initial technical problems & setup

❖ Huge Mobile Usage growth in ME exceeds that of western countries, will cause technical rush & great IPv6 adoption needs

❖ Needs to establish More Countries NRENs:
  ✓ Validates production deployment for commercial ISPs
  ✓ Leads technology awareness
  ✓ NO business case required

❖ A MUST International "IPv6 how-To" knowledge Transfer via:
  ✓ More Sustained long-term Partnerships Schemes
  ✓ Sustained & Continuously increasing IPv6 Trainings

Arab Countries:

IPv6 The Way Forward

1. Do NOT fall behind. Start your IPv6 planning now.
2. IPv6 is NO longer 'if' but 'when and 'how'. Avoid wait & rush .
3. Need to be Proactive rather than Reactive
4. It requires public sector support (local and national)
5. Strengthen the Broadband Infrastructures
6. Develop IPv6 HR Plans & Skills
7. Update National Regulations & Legal Frameworks
8. Promote R & D & Innovations
9. Carryout Timely IPv6 Trials & Phases + implementations in the public sector
10. More & More & More international cooperation: EU, Japan etc
11. Setup & Activate NREN
12. IPv6 in the higher education sector curricula
13. Set An Enforced Government "IPv6 Task Force":
   ✓ Activated Vision & Deadline
   ✓ Mandatory Obligation to Transform to "Knowledge-Economy Societies"
   ✓ Engage All multi-stakeholders to Enrich PPP

Task Force

- 2005: PAN Arab Network
- 2006: Rome Declaration
- 2007: NAP, the Network Access Points
- 200?: **CAMREN**
- **2011: ASREN:** Arab Scientific Research & Education Network

- Morocco: **MARWAN**
- Algeria: **ARN**
- Tunisia: **KCC**
- Egypt: **EUN**
- Jordan: **JUNet**

- Saudi Arabia: **KASCT & KAUST**
- Palestine: **PADI 2**
- Syria: **HIAST, SHREN**
- UAE: **ANKABUT**
- Qatar: **Qatar Foundation**

- Financial & Technical support
- Applications & Contents
- Promotion & Outreach
- Bureaucracy, Monopoly & Regulations
- *& Now: Since Early 2011: Some States Instability !*

OBSTACLE

The IPv6 Roadmap
=
A Reserve of Knowledge, Experience, & Action *NOW*

IPv6 is the *ONLY* Viable Way Ahead.. *It's Time To Act !*

The need for IPv6 Change Has Come
NO Where to Hide !

0 Days

Get IPv6 Prepared:
Think Outside The Box

A Call For Action : IPv6 Curricula @ The Educational & Academia Levels

❑ IPv6 Curricula is badly missing @ the regional pre-graduate & post-graduate academia & research levels

❑ It's time to change this to include IPv6 knowledge in those entities since IPv6 will last for decades to come !

❑ NRENs can play a central role via:

    ❑ Raising the Awareness Bar, Networking's, etc

    ❑ Collaborative Researches, etc

    ❑ IPv6 Curricula Design , Methodologies, etc

    ❑ Events, Seminars, Conferences, etc

    ❑ IPv6 Addressing Blocks Assignments

    ❑ Build-up of IPv6 Test labs, Configurations Setup, etc that may be put under the Academia Practices & Hands-on, etc

Your IPv6 Awaited-Works is a Marathon & NOT a Sprint !

?
Questions

Thank you!