Australian IPv6 Summit: IPv6? You're Standing In It! 18-20 October 2010, Melbourne, Australia

Developing IPv6 Deployment In The Middle East Region

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1. Issues in the Middle East Moving To IPv6
2. Issues In Collaboration With Partner Countries & Organizations
3. Technical Wins & Battles In Rolling Out IPv6
4. Training Programs In IPv6 At Both Technical & Managerial Levels
5. The Way Forward: Win-Win Scenarios In Middle East Deployment & Uptake Of IPv6

1 Issues in the Middle East Moving To IPv6

1 Issues in the Middle East Moving To IPv6

Regional Highlights: 1 / 3

Country	Key Milestones
UAE	✓ 2001: 1st IPv6 Summit in the Gulf / Dubai ✓ 2005: 2nd IPv6 Summit held in Abu Dhabi ✓ 2005: Establishment of the UAE Task Force ✓ 2006: 1st Task Force Meeting ✓ 2008: 3rd IPv6 Summit held in Abu Dhabi ✓ 2009: 2009 UAE E-GOV IPv6 meetings ✓ Setup of IPv6 Lab www.ipv6.ae , Lab.ipv6.ae
KSA	✓ 2008: 1st IPv6 Task Force Established www.ipv6.org.sa ✓ 2008: IPv6 Strategy Drafted ✓ 2009: Workshop on the IPv6 development ✓ 2008-2010: 9 Meetings of IPv6 Task Force ✓ Setup of IPv6 Test Lab

1 Issues in the Middle East Moving To IPv6

Regional Highlights : 2 / 3

Country	Key Milestones
Jordan	✓ 2010: IPv6 Forum / Jordan Chapter Established ✓ 2010: 1st IPv6 Workshop held ✓ 2010: IPv6 Task Force Established www.ipv6.jo
Iraq	✓ 2010: IPv6 Forum / Iraq Chapter: Under construction ✓ 2010: IPv6 Task Force: Under construction ✓ 2010: 1st IPv6 Summit Planned
Lebanon	✓ 2010: IPv6 Forum / Lebanon Chapter Established ✓ 2009: Lebanese networks are the 1st in the ME to connect & peer at the Beirut Internet Exchange (Beirut IX) over IPv6.
Oman	✓ IPv6 migration is planned by Oman TRA

1 Issues in the Middle East Moving To IPv6

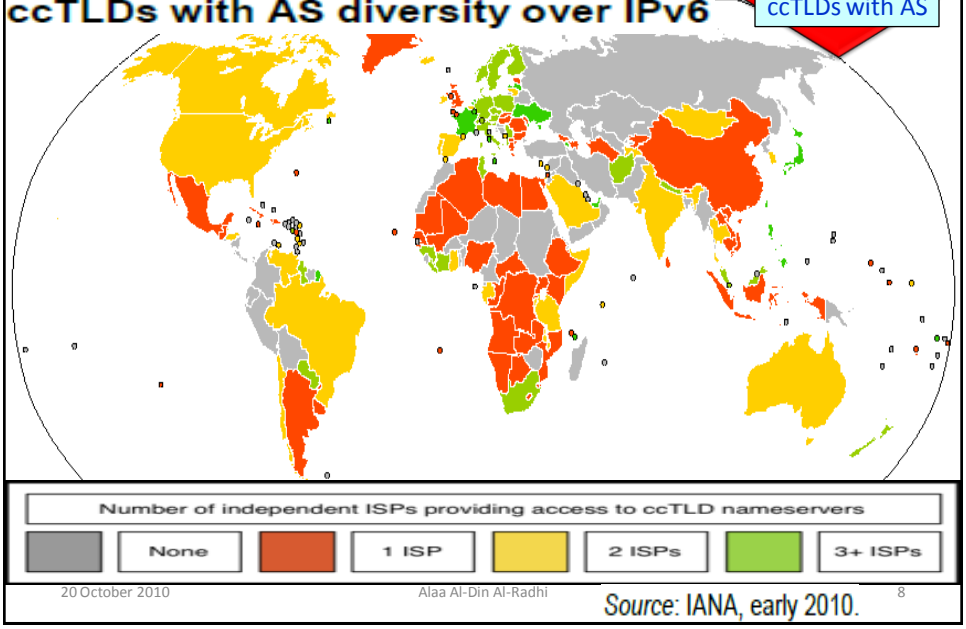
Regional Highlights : 3 / 3

Country	Key Milestones
Egypt	✓ IPv6 Task Force Established www.ipv6tf.org.eg ✓ IPv6 Forum / Egypt Chapter Established ✓ Setup of IPv6 Research Lab for VoIP & telemedicine applications
Israel	✓ IPv6 Forum / Israel Chapter launched in 2006 ✓ Held a series (2006-2010) events to promote IPv6 works & emerging future Internet technologies (RFID, Cloud Computing, etc) www.isoc.org.il
Others	✓ NO Available Data, Insight Plans, Visionary Profiles

1 Issues in the Middle East Moving To IPv6

Some Charts

ccTLDs with AS



Source: IANA, early 2010.

1 Issues in the Middle East Moving To IPv6

Some Charts

IPv6 Ripeness Rating

Legend

- An LIR can get a 'Star' for:
  1. Having received IPv6 address space
  2. Having it's address space visible in RIS (Globally routed)
  3. Having a route6 object in the RIPE Database (whois)
  4. Having it's IPv6 reverse DNS set up
- Having all of these does NOT necessarily mean you 'do' IPv6
- But together they are indicative of IPv6 readiness at an LIR level

4 Star LIRs

- Generally an indication of having your act together with regards to IPv6
- Deserves recognition

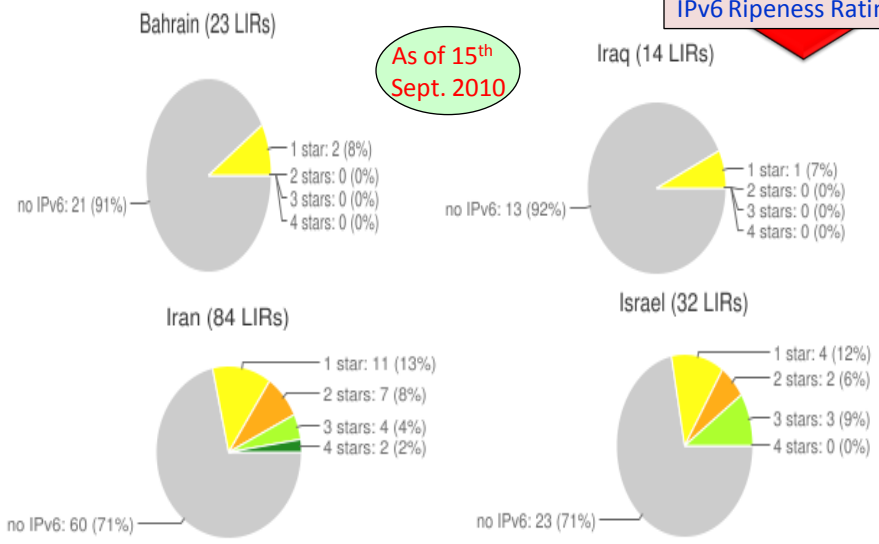
http://albatross.ripe.net/ipv6ripeness/pies.html

1 Issues in the Middle East Moving To IPv6

Some Charts

IPv6 Ripeness Rating

As of 15th Sept. 2010



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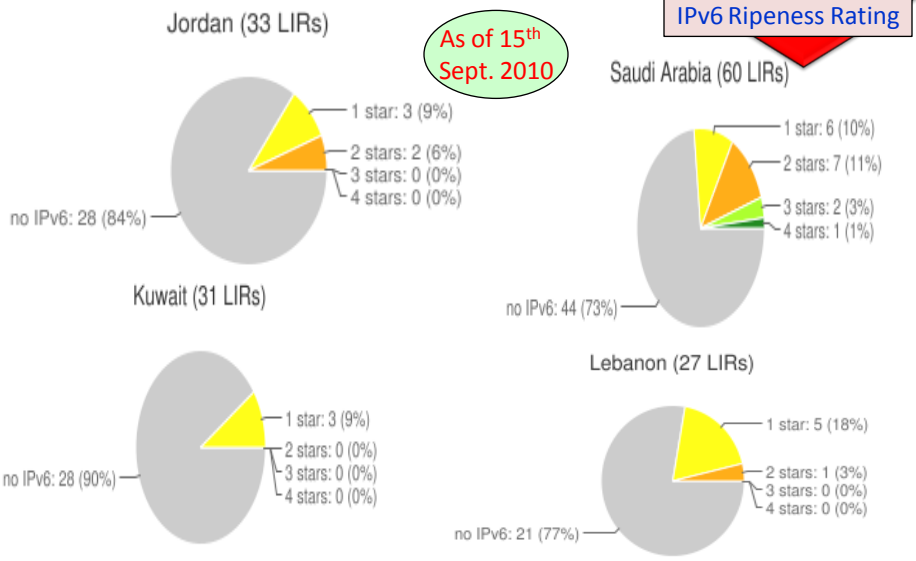

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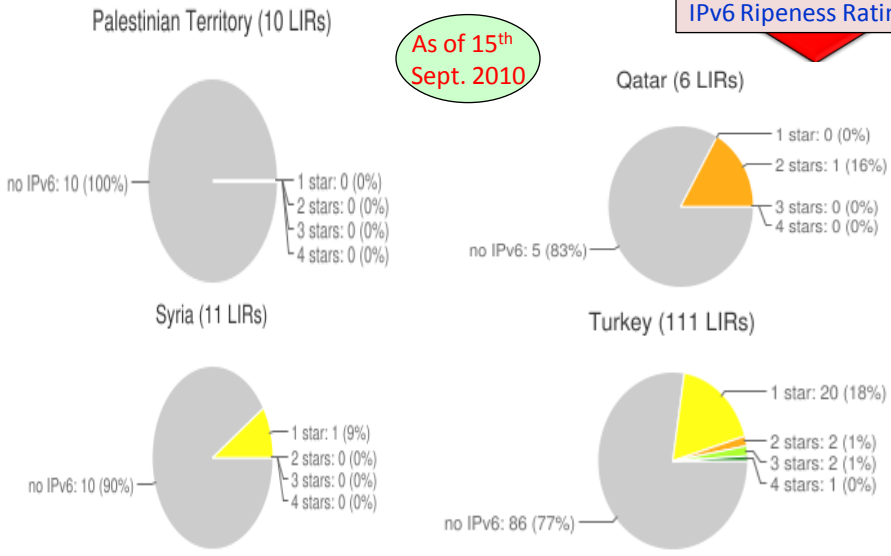

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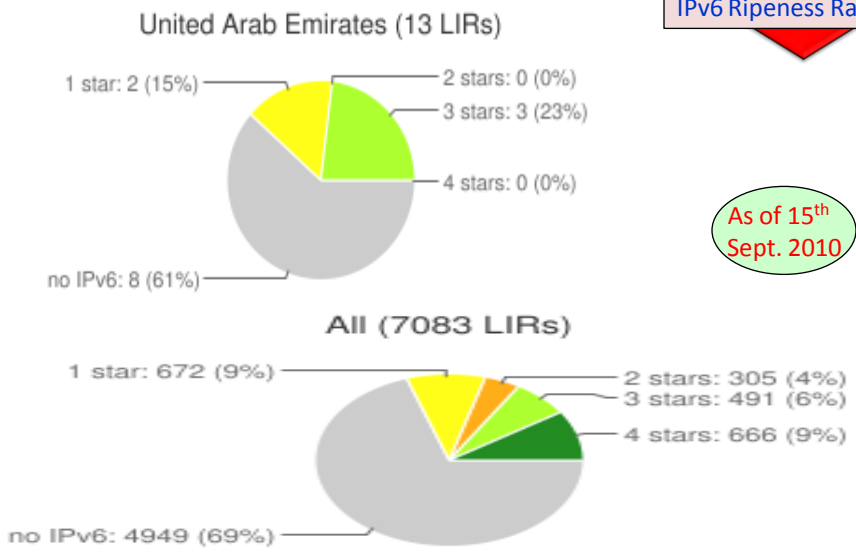

As of 15th Sept. 2010

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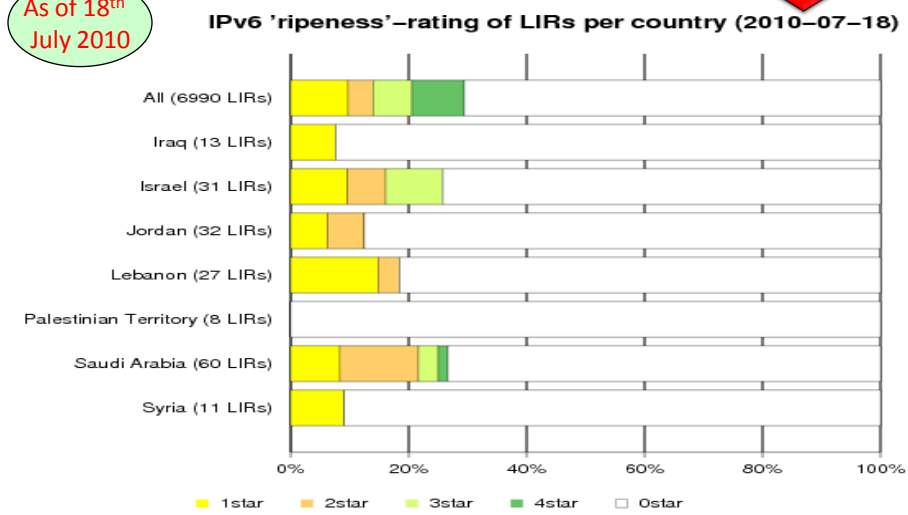
1 Issues in the Middle East Moving To IPv6

Some Charts

IPv6 Ripeness Rating

As of 18th July 2010



http://albatross.ripe.net/ipv6ripeness/pies.html

1 Issues in the Middle East Moving To IPv6

Country	IPv6 Allocations & Assignments
UAE	5
KSA	17
OM	2
KW	3
QA	1
IR	24
IQ	1
EG	6
SY	1
JO	5
TR	26
IL	9
YE	0

Some Charts

IPv6 Allocations & Assignments

As of 27th Sept. 2010

426 LIRs in ME Region

91 IPv6 Allocations To date

20 IPv6 Allocations In 2010

20 October 2010 www.ipv6actnow.org/info/statistics www.menog.net 15

1 Issues in the Middle East Moving To IPv6

Pos	Flag	Country	V	A	VP
1		Germany	233	383	9.29%
2		United Kingdom (Great Britain)	129	270	5.14%
3		Netherlands, The	148	216	5.90%
4		Russia	78	163	3.11%
5		France	74	140	2.95%
6		Switzerland	69	111	2.75%
7		Sweden	57	103	2.27%
8		Italy	49	96	1.95%
9		Czech Republic	67	89	2.67%
10		Austria	64	89	2.55%
11		Poland	53	86	2.11%
12		Norway	32	76	1.28%
13		Finland	30	50	1.20%
14		Denmark	22	48	0.88%
15		Spain	19	45	0.76%
16		Belgium	17	42	0.68%
17		Ukraine	16	38	0.64%
18		Ireland	25	36	1.00%
19		Slovenia	22	31	0.88%
20		Turkey	3	26	0.12%
21		Europe	13	25	0.52%
22		Iran	5	24	0.20%
23		Hungary	14	24	0.56%

Some Charts

IPv6 Default Free Prefixes (DFP's) Visibility

Ranking: IPv6 DFP's / Country

As of 30th Sept. 2010

20 October 2010 http://www.sixxs.net/tools/grh/dfp/ripe 16

1 Issues in the Middle East Moving To IPv6

Some Charts

IPv6 Default Free Prefixes (DFP's) Visibility

Ranking: IPv6 DFP's / Country

As of 30th Sept. 2010

Pos	Flag	Country	V	A	VP
24		Romania	11	23	0.44%
25		Portugal	13	21	0.52%
26		Luxembourg	11	18	0.44%
27		Saudi Arabia	7	18	0.28%
28		Slovakia	12	18	0.48%
29		Bulgaria	9	17	0.36%
30		Greece	5	16	0.20%
31		Estonia	9	16	0.36%
32		Iceland	7	11	0.28%
33		Serbia	4	10	0.16%
34		Latvia	4	10	0.16%
35		Lithuania	6	9	0.24%
36		Israel	4	9	0.16%
37		Croatia	3	8	0.12%
38		Armenia	2	8	0.08%
39		Cyprus	2	7	0.08%
40		Lebanon	1	7	0.04%
41		Malta	3	7	0.12%
42		Moldova	4	7	0.16%
43		Bosnia and Herzegovina	4	7	0.16%
44		United Arab Emirates	1	5	0.04%
45		Jordan	2	5	0.08%
46		Belarus	1	4	0.04%

http://www.sixxs.net/tools/grh/dfp/ripe

1 Issues in the Middle East Moving To IPv6

Some Charts

IPv6 Default Free Prefixes (DFP's) Visibility

Ranking: IPv6 DFP's / Country

As of 30th Sept. 2010

Pos	Flag	Country	V	A	VP
47		Republic of Macedonia	1	3	0.04%
48		Bahrain	0	3	0.00%
49		United States	1	3	0.04%
50		Kuwait	0	3	0.00%
51		Kazakhstan	0	3	0.00%
52		Oman	1	2	0.04%
53		Fuerstentum Liechtenstein	2	2	0.08%
54		Georgia	0	2	0.00%
55		Uzbekistan	1	2	0.04%
56		International	2	2	0.08%
57		Monaco	1	2	0.04%
58		Falkland Islands	0	1	0.00%
59		Czechoslovakia	1	1	0.04%
60		Vatican City	1	1	0.04%
61		Faroe Islands	0	1	0.00%
62		Syria	0	1	0.00%
63		Andorra	0	1	0.00%
64		Kyrgyzstan	0	1	0.00%
65		Greenland	1	1	0.04%
66		Qatar	1	1	0.04%
67		Gibraltar	0	1	0.00%

http://www.sixxs.net/tools/grh/dfp/ripe

1 Issues in the Middle East Moving To IPv6

Some Charts

IPv6 Default Free Prefixes (DFP's) Visibility

As of 30th Sept. 2010

Legend
The following colors are used in the table.

- Everything ok.
- Prefix wasn't seen for the last 24 hours.
- /32 is allocated but only a /35 is announced.
- /32 is allocated and both the /32 and the /35 are announced.
- Prefix was returned or reclaimed but is seen.
- Prefix was returned and isn't seen.
- Prefix was reclaimed and isn't seen.
- Less than 100% of the GRH participants saw this route.
- Less than 80% of the GRH participants saw this route.
- Less than 50% of the GRH participants saw this route.
- Less than 30% of the GRH participants saw this route.

V: Visible: Number of Visible Prefixes for this country.
A: Allocated: Number of Allocated Prefixes for this country (excludes returned prefixes).
VP: Visible Percentage: Percentage of visible prefixes against global number of allocated prefixes.

20 October 2010

http://www.sixxs.net/tools/grh/dfp/ripe

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1 Issues in the Middle East Moving To IPv6

Some Charts

IPv6 Default Free Prefixes (DFP's) Visibility

As of 30th Sept. 2010

Pos	Flag	Country	V	A	VP
1		Jordan	2	5	40.00%

The database currently holds 5 IPv6 DFP's , Of which 0 (0.00%) are reclaimed, 0 (0.00%) are returned to the pool and 3 (60.00%) IPv6 DFP's didn't have a routing entry. Thus 2 (40.00%) networks are currently correctly announced. 0 (0.00%) only announced a /35 while they have been allocated a /32. 0 (0.00%) announce both their /32 and their /35.

LG	Prefix	tld	NetName	Owner	AS	S	Allocated	First seen	Seen by	Last seen (*)
LG	2a00:1270::/32		JO-METROBEAM-JORDAN-...	Metrobeam Jordan		A	2009-08-18		0%	never
LG	2a00:18d0::/32		JO-NEUTELECOM-200912...	AL-HADATHEH LIL-ITISALAT ...		A	2009-12-22		0%	never
LG	2a00:18d8::/32		JO-JTC-20091223	Jordan Telecommunications...		A	2009-12-23	2010-02-12 10:02:38	99%	2010-10-01 00:32:46
LG	2a01:1d0::/32		JO-VTEL-JORDAN-20100...	VTEL HOLDINGS LIMITED/JOR...		A	2010-08-24		0%	never
LG	2a02:9c0::/32		JO-NIC-20090204	National Information Cent...		A	2009-02-04	2009-12-24 13:02:36	99%	2010-10-01 00:32:46

20 October 2010

http://www.sixxs.net/tools/grh/dfp/all/?country=jo

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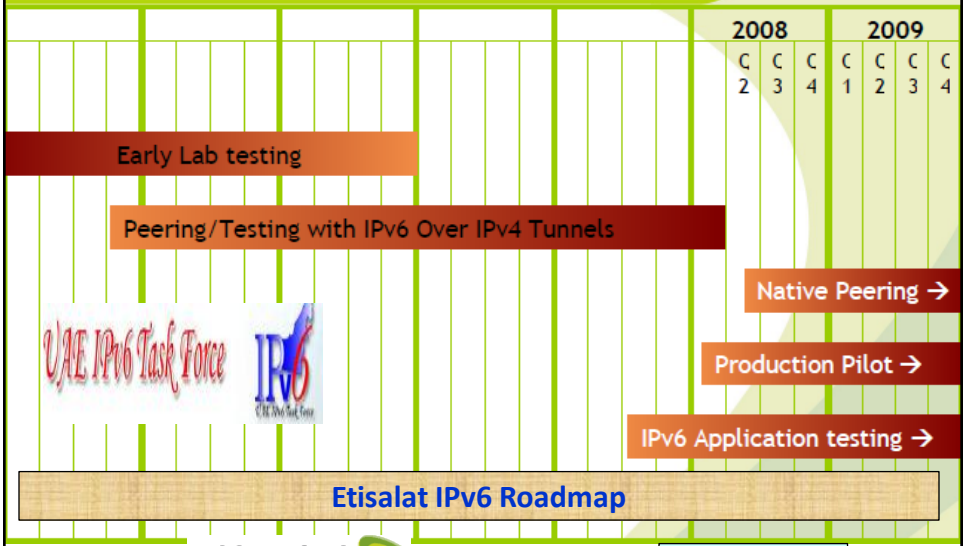
2 Issues In Collaboration With Partner Countries & Organizations

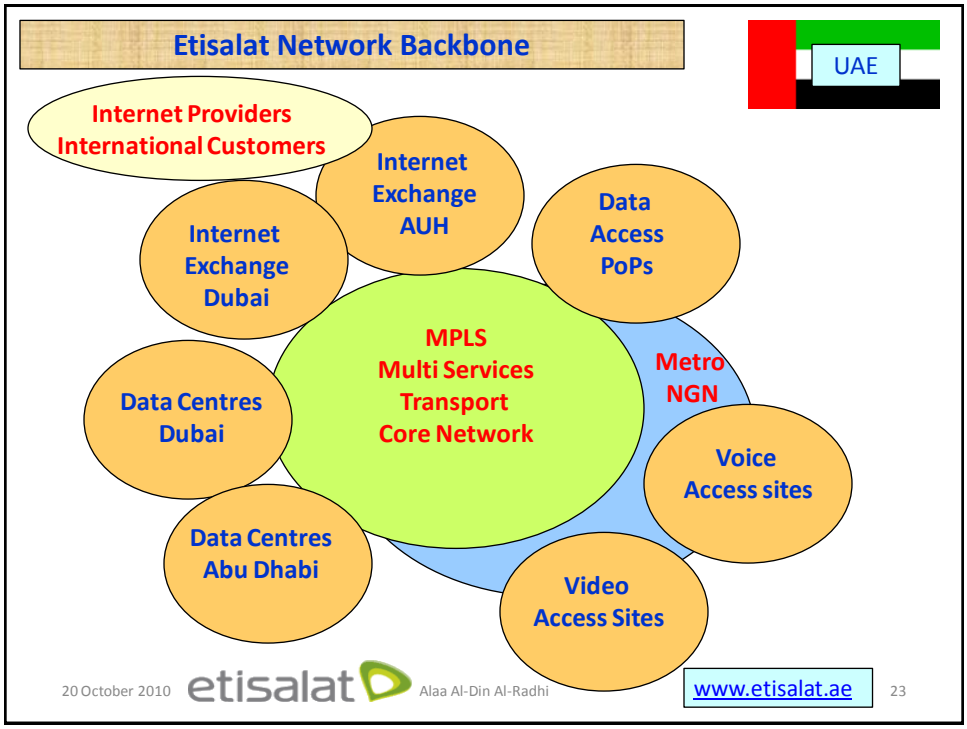
- How These Difficulties Are Being Overcome
- Plans In Place To Deal With These Issues
- Technical Examples

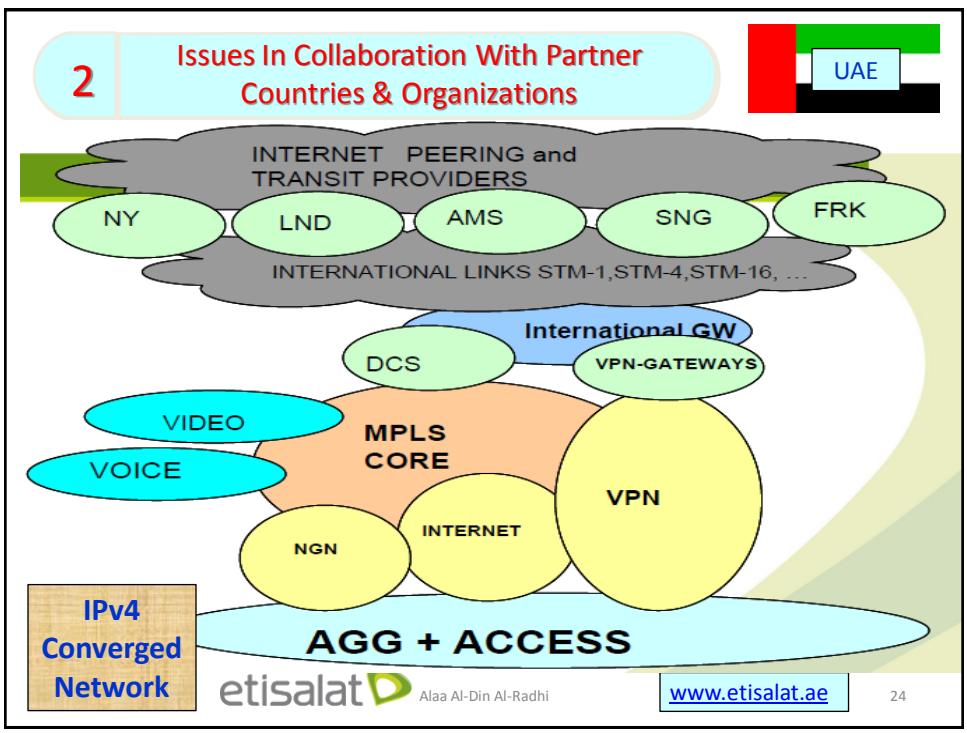
2 Issues In Collaboration With Partner Countries & Organizations

UAE



UAE IPv6 Task Force


Etisalat Network Backbone
UAE
Internet Providers
International Customers
Internet
Exchange
AUH
Internet
Exchange
Dubai
Data
Access
PoPs
MPLS
Multi Services
Transport
Core Network
Metro
NGN
Data Centres
Dubai
Voice
Access sites
Data Centres
Abu Dhabi
Video
Access Sites
20 October 2010
etisalat
Alaa Al-Din Al-Radhi
www.etisalat.ae
23


2
Issues In Collaboration With Partner
Countries & Organizations
UAE
INTERNET PEERING and
TRANSIT PROVIDERS
NY
LND
AMS
SNG
FRK
INTERNATIONAL LINKS STM-1,STM-4,STM-16, …
International GW
DCS
VPN-GATEWAYS
VIDEO
VOICE
MPLS
CORE
VPN
NGN
INTERNET
AGG + ACCESS
IPv4
Converged
Network
etisalat
Alaa Al-Din Al-Radhi
www.etisalat.ae
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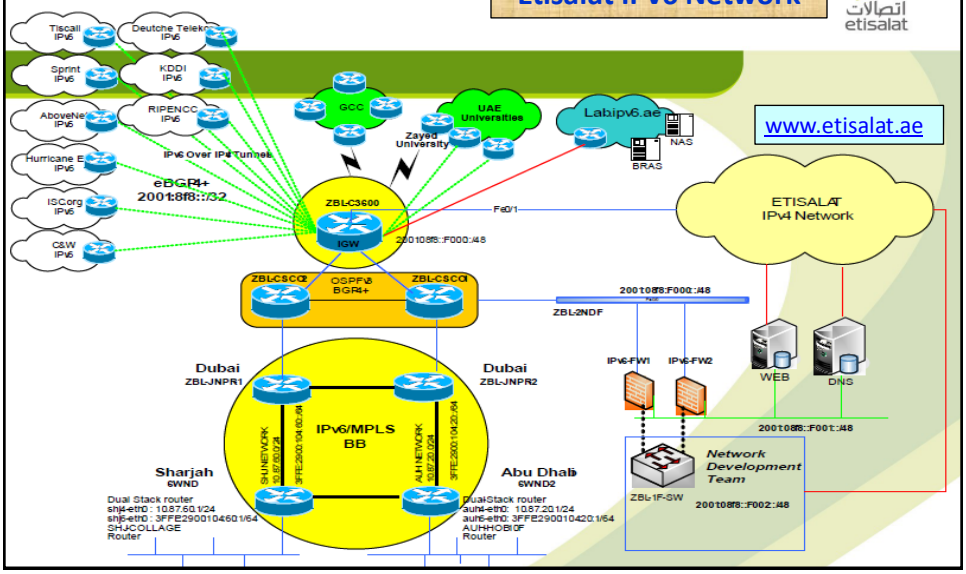
2 Issues In Collaboration With Partner Countries & Organizations

UAE

Etisalat IPv6 Network



2 Issues In Collaboration With Partner Countries & Organizations

UAE

IPv6 Peering

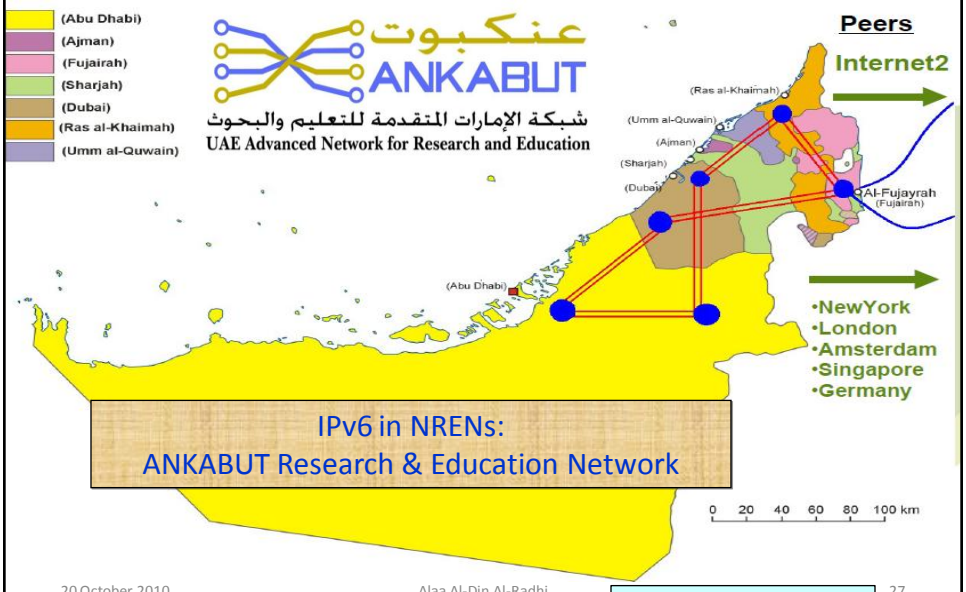
- Sprint
- Abovenet
- Hurricane Electric
- Tiscali
- Deutsche Telekom
- ISC , F-root DNS
- QTel
- C & W
- KDDI
- RIPE – k-root DNS

IPv6 Test Beds

- 6Bone via Sprintv6 - 2001
- QTel in Qatar
- Zayed University
- Khalifa University of Science, Technology and Research
- Etisalat Academy

2 Issues In Collaboration With Partner Countries & Organizations

UAE



IPv6 in NRENs:
ANKABUT Research & Education Network

www.kustar.ac.ae/ankabut/

2 Issues In Collaboration With Partner Countries & Organizations

KSA

IPv6 Strategy Implementations Tracks

Strategy Implementation Tracks

Infrastructure	Awareness
• Five (5) Initiatives:	• Five (5) Initiatives:
• IPv6 Addressing	• IPv6 Task Force
• IPv6 Commercial Support for Nation Wide Infrastructure	• Outreach Activities
• .SA ccTLD IPv6 Compliance	• International Cooperation
• IPv6 Compliant Internet Filtering	• IPv6 Training
• IPv6 Lab	• IPv6 Compliant Procurement

www.citc.gov.sa

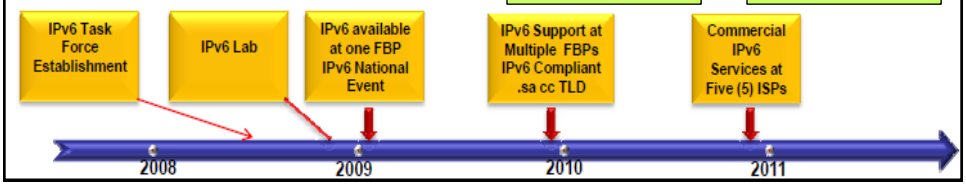
www.ipv6.org.sa

2 Issues In Collaboration With Partner Countries & Organizations

KSA

Milestones	Why?	Date	Status
Basic IPv6 Connectivity available at ONE FBPs	Essential and Enough to start offering IPv6 to ISPs and End Users	Early 2009	Bayanat & Mobily connected No commercial service yet
IPv6 Task Force Saudi Arabia	Essential to raise awareness and encourage deployment	July 2008	Already Established
Establish an IPv6 Lab	Establish and Disseminate practical IPv6 Experience	15 January 2009	Ready
IPv6 workshop	Raise awareness and encourage the IPv6 deployment	8 February 2009	300 Attendee
IPv6 at Multiple FBPs	Important for ISPs and End Users to have more than one Choice	End 2009	TBC
IPv6 Compliant.SA ccTLD Registry	Essential to run IPv6-only hosts or an IPv6-only infrastructure	End 2009	TBC
Commercial IPv6 Services available from Five (5) ISPs	More choices to end users	End 2010	TBC

www.citc.gov.sa www.ipv6.org.sa



2 Issues In Collaboration With Partner Countries & Organizations

IPv6 Forum Deployment Expertise & Skills

CERTIFIED COURSE · CERTIFIED COURSE · CERTIFIED ENGINEER · CERTIFIED ENGINEER · CERTIFIED TRAINER · ISP

- ✓ Established Local ME Countries Chapters. More Local Chapters is Needed
- ✓ Conducted IPv6 Workshops. More is Needed
- ✓ Launched the "Arab V6 Council"
- ✓ ME Partner Countries needs to do more collaborations with IPv6 Forum & gain use of its capabilities: Test beds, Certifications programs, etc
- ✓ Issued a series of documents: IPv6 Forum Roadmap & Vision 2010, etc

EGYPT IPv6 TASK FORCE · IPv6 FORUM Turkey · IPv6 FORUM JORDAN

2 Issues In Collaboration With Partner Countries & Organizations

✓ www.IPv6ActNow.org launched in June 2009: is One-stop shop for IPv6 information. Sections include:
- How To Act Now
- Community interviews & Videos
- Latest Statistics on IPv6 growth
- RSS feed of IPv6-related news & developments
- Forums, links and information

✓ RIPE Labs & IPv6:
- IPv6 Measurements Compilation
- Measuring IPv6 at Web Clients & Caching Resolvers
- IPv6 Ripeness

✓ IPv6 training for LIRs:
- Started IPv6 Training Courses in October 2009
- More ME Countries local / Host Trainings is needed

2 Issues In Collaboration With Partner Countries & Organizations

MENOG: Middle East Network Operators Group
A place where the Internet Operations Community gets to meet, discuss, collaborate in addition to attending educational tutorials & hands-on workshops on important topics such as IPv6 Routing. www.menog.net

✓ Conducted 6 Past Meetings since 2007 inaugural Meeting
✓ 7th MENOG meeting in Oct. 2010, Istanbul Turkey
✓ In Every MENOG Meeting: "IPv6 Workshop" as part of "IPv6 Road show". "IPv6 Road show" 3-5 day hands for technical staff :
  ✓ **Done:** Bahrain, Lebanon, Saudi Arabia, & Dubai
  ✓ **Planned:** Turkey, Syria, Iran, Iraq, Oman & Jordan
✓ More Cooperation between Key players is needed
✓ More "IPv6 Workshop" is needed
✓ More forum / blogs discussions is needed
✓ A permanent local "IPv6 Workshop" / Country is vital

2 Issues In Collaboration With Partner Countries & Organizations

- ✓ Capacity Building & technical assistance 4 developing countries
  - "IP-Based Seminar" in Tunisia, November 2008
  - "Arab IPv6 Workshop", Sudan, June 2010, Co-hosted with "7th Meeting of Arab Regulators network"
  - "Arab Regional Workshop on IPv6": Egypt-July 2010
- ✓ Formed ITU IPv6 Group: 2 Meetings in March & Sept. 2010
- ✓ Issued a series of IPv6 Policy papers
- ✓ ITU have a strong impact on ME & Arabic Region, so:
  - More Collaborations with ME member States & Multi-stakeholders is vital
  - More local / host IPv6 Workshops is quite vital
- ✓ Launched IPv6 Virtual Training on ITU Academy: http://academy.itu.int :
  - More Frequency of those IPv6 virtual training
  - More ME Governments Staff Engagements in those virtual trainings
  - Engagement of Local ME IPv6 Trainers As trainers & Capacity builders to encourage local ME community participations

3 Technical Wins & Battles In Rolling Out IPv6

3 Technical Wins & Battles In Rolling Out IPv6

Governments: Set "IPv6 Strategy & Roadmap" 1 / 2

- Set An Enforced Government "IPv6 Task Force":
  - Activated Vision & Deadline
  - Mandatory Obligation to Transform to "Knowledge-Economy Societies", e.g. UAE Vision 2021, etc
  - Engage All multi-stakeholders to Enrich PPP
- Where to look at: Some Case Studies & Know-how, e.g.:
  - Malaysian IPv6 Roadmap
  - India IPv6 Roadmap
  - 2010 US Federal Directive to Support IPv6. (Tip): Obama Administration highlights IPv6 issue
- Raising Awareness on the real issues
- Supporting knowledge sharing

Task Force

3 Technical Wins & Battles In Rolling Out IPv6

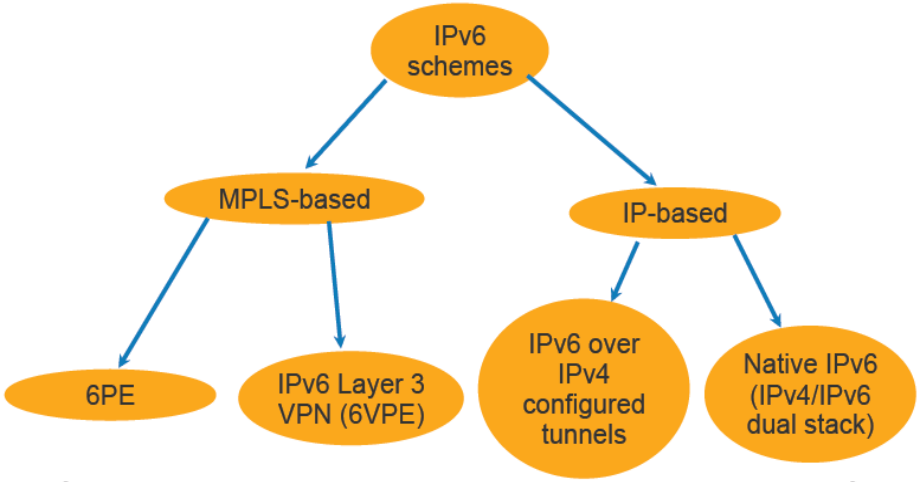
Governments: Set "IPv6 Strategy & Roadmap" 2 / 2

- Strengthen the Broadband Infrastructures
- Develop IPv6 HR Plans & Skills
- Update National Regulations & Legal Frameworks
- Promote R & D & Innovations
- Carryout Timely IPv6 Trials & Phases
- More & More & More international cooperation: EU, Japan, Australia, China, USA, etc. Learn & adopt what others are doing
- IPv6 in the higher education sector curricula
- Establish IPv6 CoE (Center of Excellence)
- Define Economic Impacts: IPv6 Business Models, Tools, etc
- Implementing financial incentives
- Adopting & using IPv6 themselves in the public sector.

Task Force

3 Technical Wins & Battles In Rolling Out IPv6

ISPs: Analyze Your Migration : Various Transport Schemes



3 Technical Wins & Battles In Rolling Out IPv6

IPv6 Challenges Priorities Addressing

"HIGH" priority challenges	Address Allocation Policies	Policy
	Site Multi-Homing	Business
	Quality of Service	Technical
	Security	Technical
	Interoperability Between IPv4 & IPv6	Technical
	Network Address Translators (NATs)	Business
	Impacts on Network Traffic & Routing	Technical
"MEDIUM" priority challenges	Impacts on Privacy/Legal Issues	Policy
	Management Tools (Dual-stack & IPv6 Networks)	Technical
	Impacts on Infrastructure Reliability	Technical
	Network Renumbering (Portability)	Business
	Peering Evolution (Impacts on Settlements)	Business
	Impacts on Access Networks	Business
"LOW" priority challenges	Separation of Locator & Identifier	Business
	Vendor Availability	Business
	Dual-Stack with Domain Name System (DNS)	Technical
	Relationships with other Numbering Systems	Technical
	Cost	Business

3 Technical Wins & Battles In Rolling Out IPv6

ISPs: Where to start with IPv6

- Build a lab:
- Start @ the border

Conduct an IPv6 Readiness Assessment

- Network Infrastructure : Routers and Switches
- Servers & PCs (i.e. Operating Systems)
- Network Devices : Appliances, KVM, etc
- Network management tools (HP, Cisco, etc)
- Security: Everywhere you have it now; Needs to be replicated
- Applications : Dealing with IPv6 addresses
- OSS systems: Billing, Accounting, Radius, etc
- In-house skills

3 Technical Wins & Battles In Rolling Out IPv6

Be Proactive & NOT Reactive: What Stops you from IPv6 Implementation?

- ✓ It is too expensive to implement
- ✓ It is just too hard to implement right now
- ✓ I don't know where to start
- ✓ My customers aren't asking for it
- ✓ So much doesn't support it
- ✓ What is IPv6?
- ✓ Who can I turn to for help?

3 Technical Wins & Battles In Rolling Out IPv6

Understand Well: IPv6 Business Case Benefits On The Long Run

- 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 ↓

Are you Ready for the Converged World ??

3 Technical Wins & Battles In Rolling Out IPv6

IPv6 Transition & Migration Techniques: Expect all of these combination use

Encapsulate IPv6 Packets inside IPv4 Packets

2 Tunneling
- 6to4
- 6rd
- ISATAP
- Teredo
- Tunnel Broker

Automatic

Manual

3 Protocol Translation

Put it as Last resort due to complexity & security issues

IPv4-IPv6 Conversion Using NAT

1 Dual Stack

Best but with Increased Latency & DNS server load

Run IPv6 & IPv4 on The Same Network Interfaces

Major Possible Scenarios

3 Technical Wins & Battles In Rolling Out IPv6

Comparison of Different Transition Methods

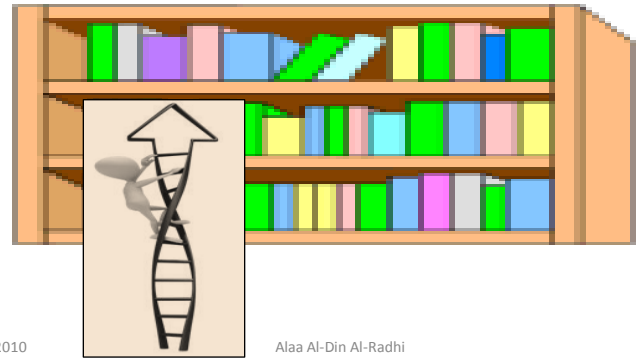
Equipments	Clients and Servers have to support both IPv4 and IPv6	Great for connecting IPv4-only end nodes and IPv6-only nodes	Great for using older legacy equipments
Complexity	Easy to implement, but complex management	Simple network design	Easy to implement over existing IPv4 infrastructure
Scalability	Same as pure IPv4 networks	Limited (Translation)	Good (Tunneling)
Performance	Can be slow with stacked protocol on the network	High capacity translators are required	Depend on tunnel speed
Security	IPSec (Dual Stack)	Classic NAT security issues; End-to-end security impossible	IPSec
Cost	Can be high	Low initial costs	Creation of a tunnel over the internet may be a high cost
Weakness	Asymmetric paths are not supported	Services cannot be supported on end-to-end basis; Single point of failure	Tunnel breakdown will fail the network

3 Technical Wins & Battles In Rolling Out IPv6

IPv6 Deployments Lessons learned

- Deploy IPv6 @ the edges First
- Dual Stack is acceptable @ most cases
- Tunnels are less desirable
- NOT all transit is equal
- Windows XP is broken but usable. Windows Vista & 7 are better
- "IPv6 ready" vendors are pushing more in the market
- Steps for Dual-Stack Deployments:
  1. Get IPv6 Addresses
  2. Configure Routers
  3. Configure DNS
  4. Configure public-facing services (web, mail, etc)
  5. Configure Clients

4 Training Programs In IPv6 At Both Technical & Managerial Levels



4 Training Programs In IPv6 At Both Technical & Managerial Levels

ALERT ME NOW

ME Countries "IPv6 Training" Status

- ✓ ME Countries needs huge localized "IPv6 Trainings" programs
- ✓ Turkey, Iran, UAE, & KSA are leading relatively. Other countries are badly lagging behind. Hosting IPv6 Trainings is quite essential.
- ✓ Partnerships with international bodies (vendors, organizations, etc) is of utmost need to the region
- ✓ A long-term sustained "IPv6 Collaborations" is quite vital with leading international bodies to transfer & share knowledge.
- ✓ Generally: Major ISPs & Governments are still in the "Awareness Phase". "What's Next" is rarely planned, which include "IPv6 Trainings" as a foundation milestone for "IPv6 Preparedness".
- ✓ Budgets should be allocated for "IPv6 Trainings"

www.ripe.net/training/ipv6/index.html

4 Training Programs In IPv6 At Both Technical & Managerial Levels

IPv6 Training Providers

- ✓ RIPE Launched "IPv6 Trainings" in July 2009
- ✓ Also, "Middle East IPv6 Roadshow" (Via MENOG)
- ✓ Excellent Materials for "IPv6 for LIRs" Provided: Hands-On; Exercise Labs, etc
- ✓ Countries like Iran & Turkey have more enrolments that Arab Countries: An indication of negative preparedness !
- ✓ "IPv6 Workshop" Conducting during MENOG Bi-Annual Meetings
- ✓ MORE Arab Countries Enrolments is quite necessary: Hosting localized Training Courses, , Sending Abroad, etc

www.ripe.net/training/ipv6/index.html

4 Training Programs In IPv6 At Both Technical & Managerial Levels

IPv6 Training Providers

IPv6 FORUM CERTIFIED COURSE | IPv6 FORUM CERTIFIED COURSE | IPv6 FORUM CERTIFIED ENGINEER | IPv6 FORUM CERTIFIED ENGINEER | IPv6 FORUM CERTIFIED TRAINER

- ✓ IPv6 Forum Launched "IPv6 Education Certification Program" in September 2010
- ✓ The program defines & certifies courses, engineers & trainers with "Silver & Gold Logo levels" and requires IPv6 implementation on the web site of the education program.

4 Training Programs In IPv6 At Both Technical & Managerial Levels

IPv6 Training Providers

- ✓ Inno has been assigned by EU to identify the main actors in all sectors & the processes related to "IPv6 Training"
- ✓ A Database of "IPv6 Trainings Providers" is available
- ✓ Comprehensive "IPv6 Courses" Coverage:
  - ✓ Generic IPv6 Training: *Security, Implementations, Software, etc*
  - ✓ IPv6 Courses for Management & IT Strategists: *Technology, Management, Security, etc*
  - ✓ Platform Specific IPv6 Training: *Cisco, Windows, Linux, etc*

www.inno-group.com www.training4ipv6.eu

5 The Way Forward: Win-Win Scenarios In Middle East Deployment & Uptake Of IPv6

Get Prepared: Think Outside The Box

5 Win-Win Scenarios In Middle East Deployment & Uptake Of IPv6

- ✓ Don NOT fall behind, start your IPv6 planning now. If you have NO IPv6 plan, then You're behind schedule
- ✓ IPv6 is NO longer 'if' but 'when and 'how', so we need to avoid wait & rush . Start now rather than later
- ✓ With the world converging towards IP-based communications, ME need to be proactive to invest for tomorrow with IPv6.
- ✓ Responsibility lies on the country to take up the challenge & take leadership in developing & deploying IPv6 solutions
- ✓ The change in core infrastructure requires supporting leadership as the full benefit can only be gained via IPv6 migration
- ✓ It requires public sector support (local and national) and buy-in from the Business / private sector

Middle East IPv6 Current Challenges: 1 / 3

- LOW Awareness Profile & High Uncertainty
- TRIPPED Government IPv6 Action & Intervention Plans
- Reluctant Policy Settings by TRCs/ TRAs for Advisory & Visionary Purposes
- NO IPv6 Deployment in The Public sector
- Reluctant ISPs. ONLY Etisalat® (UAE ISP) is Deploying IPv6
- 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

Middle East IPv6 Current Challenges: 2 / 3

- NO "Ahead of the Game" Vision. Instead: "Wait & See" vision.
- NOT that real customer awareness of demands
- Governments traditionally have the upper hands leadership. If NO government forcemeats, push is always limited
- Business Case & Models is NOT really well addressed by ISPs regarding scalability & future Internet growth
- Limited Broadband infrastructures hurdle the IPv6 acceleration. Broadband Home & IPv6 = A Must
- Traditional Mandate of "Ready-Made" solutions to avoid initial technical problems & setup
- RARE Governments Investments in General

Middle East IPv6 Current Challenges: 3 / 3

- Mobile Usage growth in ME exceeds that of western countries. This will cause technical rush, great IPv6 adoption needs & probably misinformation!
- Establish More Countries NREN: National Research & Education Networks:
  - ✓ 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: Abroad, Local, on demand, etc
- ✓ More Investments to build "IPv6 Expertise"

Win-Win Scenarios In Middle East Deployment & Uptake Of IPv6

IPv6 Adoption Key Imperatives

Leadership

- Senior management buy-in & support as a key success factor
- Government & companies strategies to adopt , transform & monitor progress
- Decree of purchases & RFPs to include IPv6 support
- Awareness on the importance of IPv6 to their business(Public & private)
- Focused on new business capabilities & innovations

Skills

- Building IPv6 technical & business skills through training (Network, Applications & Services)
- Establish an IPv6 Test Lab (Test-beds)
- Establish large pool of experts with experience in IPv6 deployment

Collaboration

- stakeholders– Government, Industry and Academia
- International IPv6 providers (Transit, test-beds …etc)
- Task-force meeting & events
- Continuous collaboration between Technical & Business entities & abide by the time-line

Win-Win Scenarios In Middle East Deployment & Uptake Of IPv6

3 Pillars of IPv6 Readiness

Operating System & IP Stack

Software Applications

Networks; Core, Edge and Access

5 Win-Win Scenarios In Middle East Deployment & Uptake Of IPv6

IPv6 Deployment Strategies

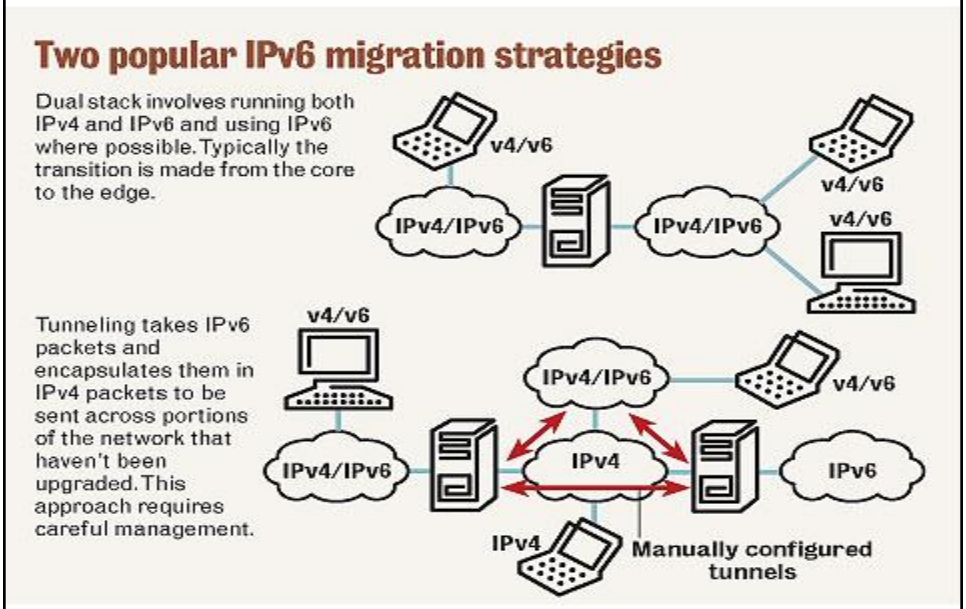
Dual-stack : To allow IPv4 & IPv6 to co-exist in the same devices and networks

Tunneling : To avoid dependencies when upgrading hosts, routers, or regions

Translation: To allow IPv6-only devices to communicate with IPv4-only devices

All of these are used in combination

2 popular Migration Strategies



Option 1 (Dual Stack) Backbone Becomes IPv6

Major Common Use Option@ Startup

Pros

✓NO applications need to be converted. The applications remain untouched

✓This approach is network ONLY. Only the backbone or core routers need to be converted to dual stack (IPv4 & IPv6)

Cons

✓If there is a problem, many users may be affected.

✓If the path or route fails, it will take longer time to recover

✓More time for transaction

Option 2: Tunneling Boundary Converts to IPv6

NOT Easy Option: A lot of Tunneling Works!

Pros

- ✓The core remains IPv4.
- ✓Fewer pieces of equipment need to be converted.
- ✓No change to backbone routers.
- ✓Routing is less complex.
- ✓DNS can remain IPv4.

Cons

- ✓Scalability of tunneling with a lot of traffic is an issue. Tunneling adds at least 20 bytes to each packet.
- ✓Many pieces of equipment need to be converted.
- ✓ Security problems

5 Win-Win Scenarios In Middle East Deployment & Uptake Of IPv6

How to Plan Deploying IPv6

Service Providers

1. Providing an IPv6 service at the customer access level
2. Running IPv6 within the core infrastructure itself
3. Interconnecting with other IPv6 service providers

Enterprises

1. Set up an IPv6 domain and connect to an existing network
2. Set up 2 or more IPv6 domains and interconnect them over your existing IPv4 infrastructures

5 Win-Win Scenarios In Middle East Deployment & Uptake Of IPv6

Pre-Deployments Tasks & Checklists

1. Get and Plan your IPv6 address space, (service provider) you need to register for an IPv6 address contact RIRs LIRs , (enterprise) request an IPv6 prefix from your service provider
2. Set up your DNS
3. Select IPv6 Network management tools
4. Select required routing protocols.

5 Win-Win Scenarios In Middle East Deployment & Uptake Of IPv6

You need to know some IPv6 Basics like

1. IPv6 address types and formats
2. ICMPv6, neighbor discovery, security, and mobility
3. IPv6 routing protocol: OSPFv3, BGP4+,IS-IS, RIPng, EIGRPv6
4. IPv6 integration and coexistence strategies ,vendors support
5. IPv6 host configuration (Solaris, Microsoft, and FreeBSD)
6. What to test in IPv6 and How !?
7. How to connect to the IPv6 Internet

Every Last Word

We must NOT only learn but adapt !

There is NO answer, but ONLY solutions

Think Global, Act Local

You can NOT gain ground if you are standing still !

A New Network View: IPv6 Integration Layers: The ONLY future likely end situation

IPv6

Thank You!

WORK IN PROGRESS !
Stay Tuned !
Comments Welcomed !

Questions?