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IPv6 Deployment Case of Sudan/SudREN



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Sudanese Research & Education Network

شبكة البحث العلمي والتعليم السودانية

SDv6
فريق العمل السوداني
للإصدار السادس من بروتوكول الإنترنت



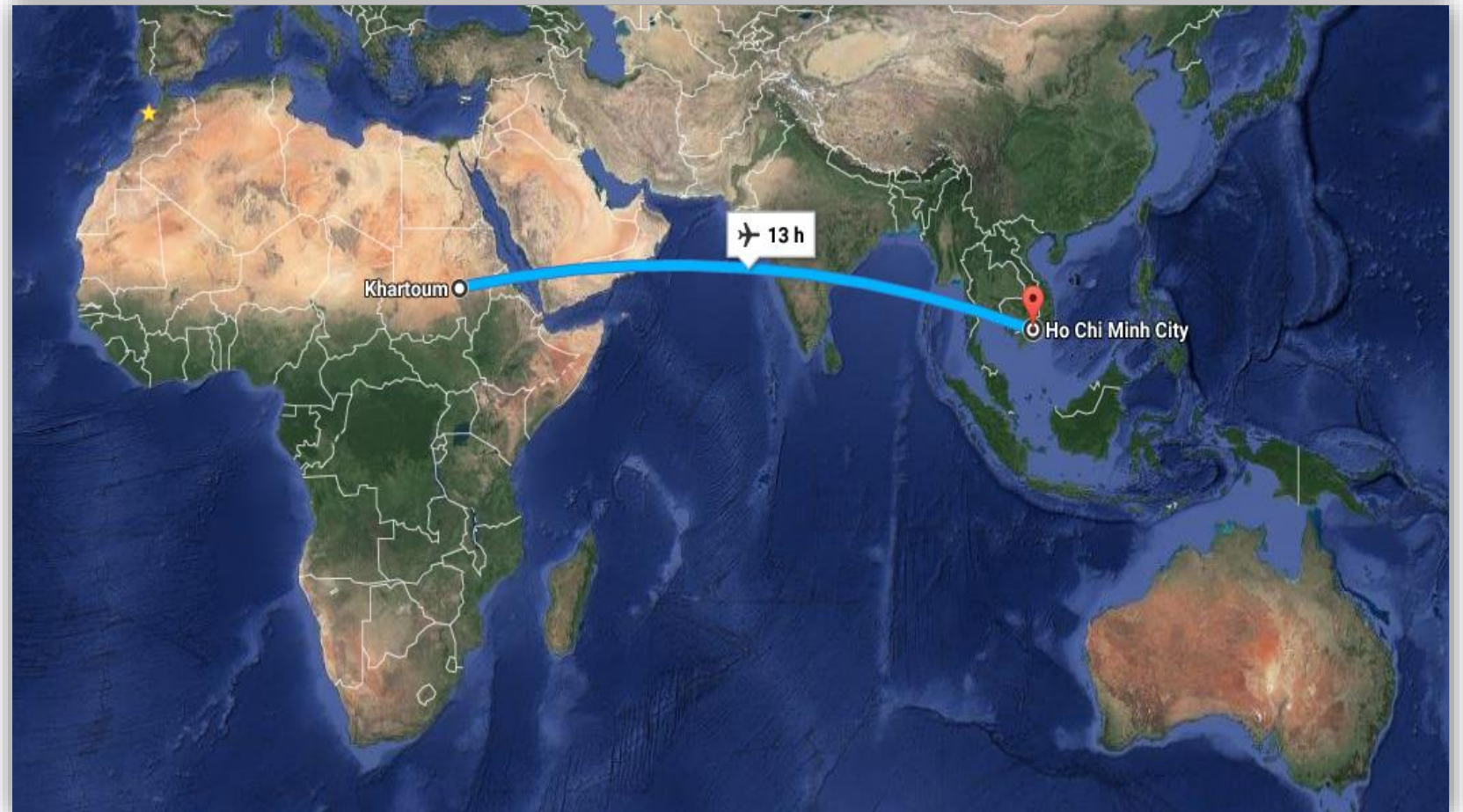
الهيئة القومية للإتصالات
National Telecom Corp.



Republic of the Sudan



Area	1,886,068 km ²
Population	40.23 M
Language	Arabic
GDP	\$179.5 B
Per capita	\$4,834
Calling code	+249
ccTLD	.sd, السودان.
Penetration	85%
Internet Users	9.98 M
IXP	7 ISPs Since 2011
Service Region	AfriNIC



Sudanese Experience Toward IPv6



فريق العمل السوداني

للإصدار السادس من بروتوكول الإنترنت

Activities

- ✓ 1st IPv6 Workshop; 24 June, 2010
As a side event of AREGNET Meeting.



Activities

- ✓ 2nd IPv6 Workshop; 1 August, 2010
Publish the Sudanese IPv6 Migration Plan (2011-2015).
Formation of the SDv6TF.



Activities

- ✓ 3rd IPv6 Workshop; 1-4 November, 2010
2nd IPv6 Training.
Internet Governances day.



Activities



- ✓ 4th IPv6 Workshop; 27 October, 2011
Evaluation of the IPv6 Deployment in Sudan on 10 Major Information Network Operator



Sudanese IPv6 Training Center

In Collaboration with NAV6 Malaysia



SDv6
فريق العمل السوداني
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Activities



- ✓ 5th IPv6 Workshop; 26-30 October, 2013
IPv6 Workshop for Yemeni Delegations



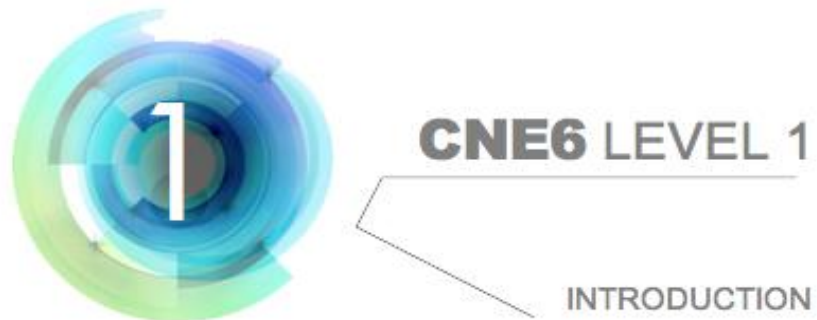
Activities

✓ MyREN IPv6 Workshop; 25 April - 7 May 2015

Advance IPv6 Training Workshops



Number of Session Organized	26
Total Number of Attends	1000+
CN6 Exam Taken	218
CNE6 Level Certified	204
Certified IPv6 Trainers	12



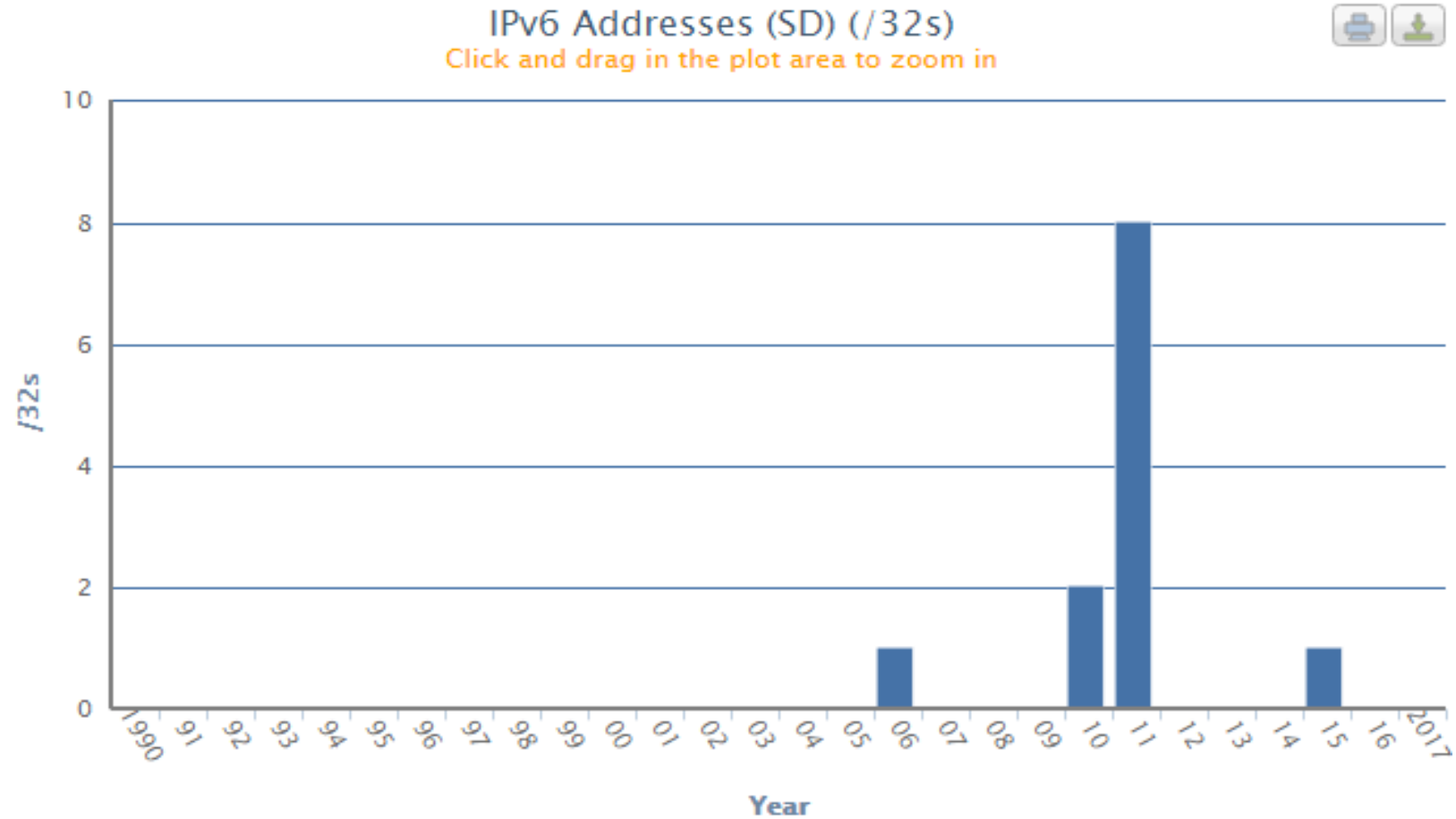
IPv6 Deployment

- ✓ Development of the National IPv6 Migration Plan (2011-2015)
- ✓ Participate on IPv6 Events (ITU, ICANN, AfriNIC, NAV6)
- ✓ Formation of the SDv6TF
- ✓ More than Twenty Six workshops are organized
- ✓ Collaborate with NAV6 in continuous training program
- ✓ Operators are IPv6 Enable/Ready.
- ✓ Hosting AfriNIC-17



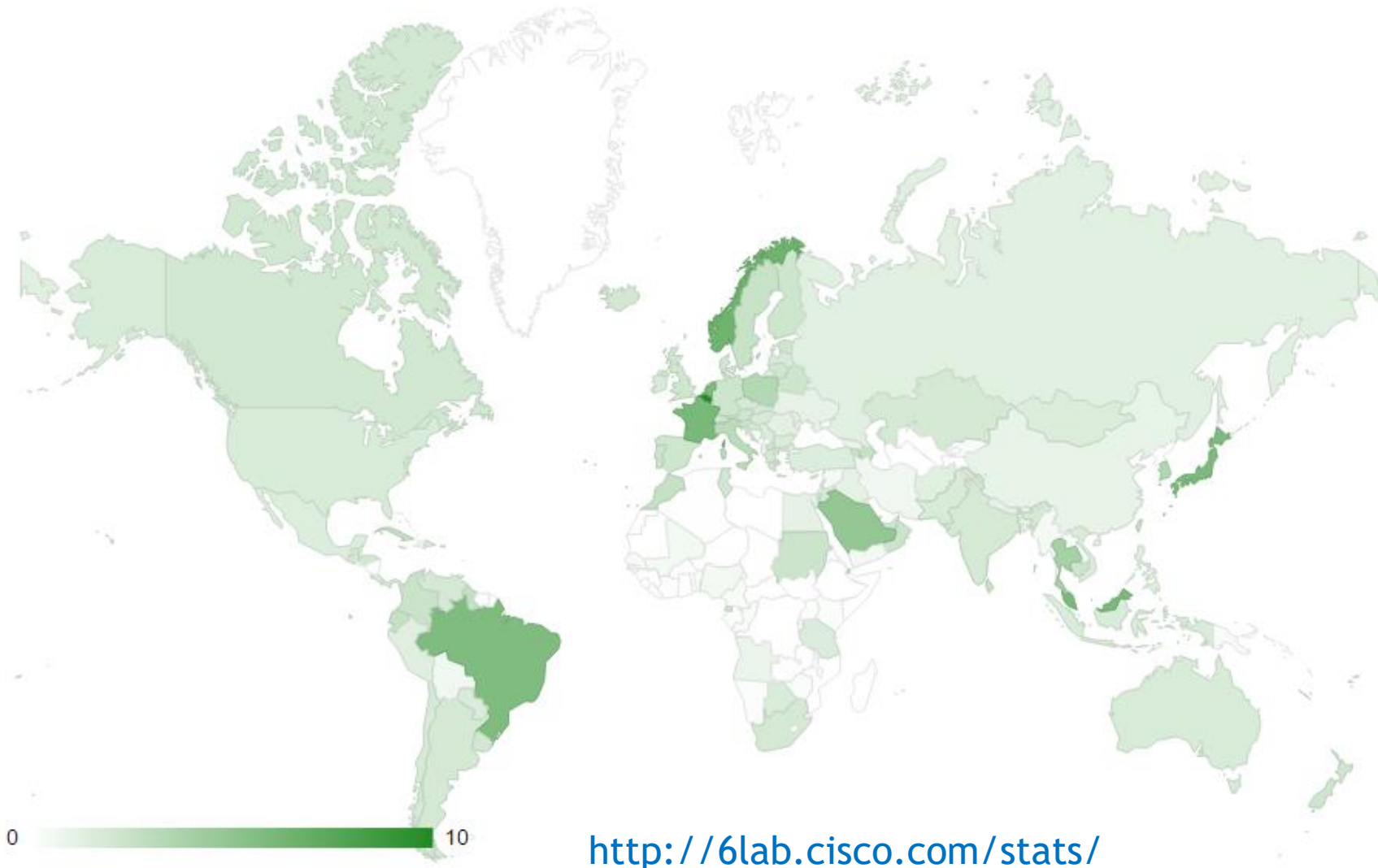
AFRINIC-17
KHARTOUM
SUDAN
24 - 29 NOVEMBER 2012

IPv6 Assignment



<http://afrinic.net/en/services/statistics/country-stats>

Development in IPv6 Assignment



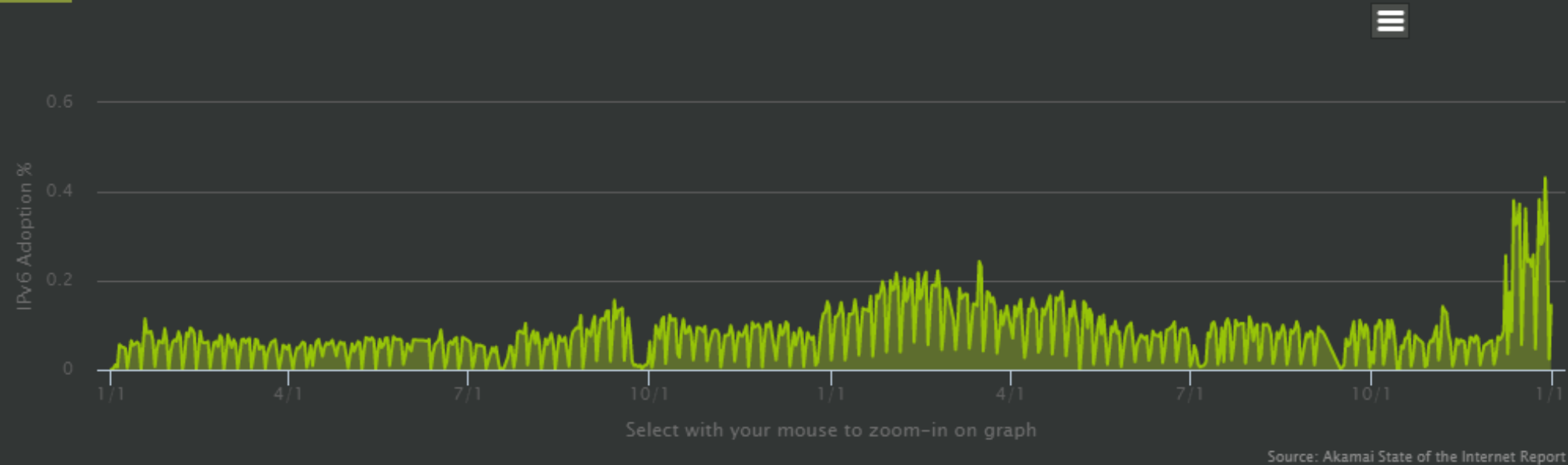
<http://6lab.cisco.com/stats/>

IPv6 Traffic

61 0.2% Hong Kong

62 0.2% Saint Barthelemy

63 0.1% Sudan



64 0.1% Cyprus

Sudanese Experience Toward IPv6



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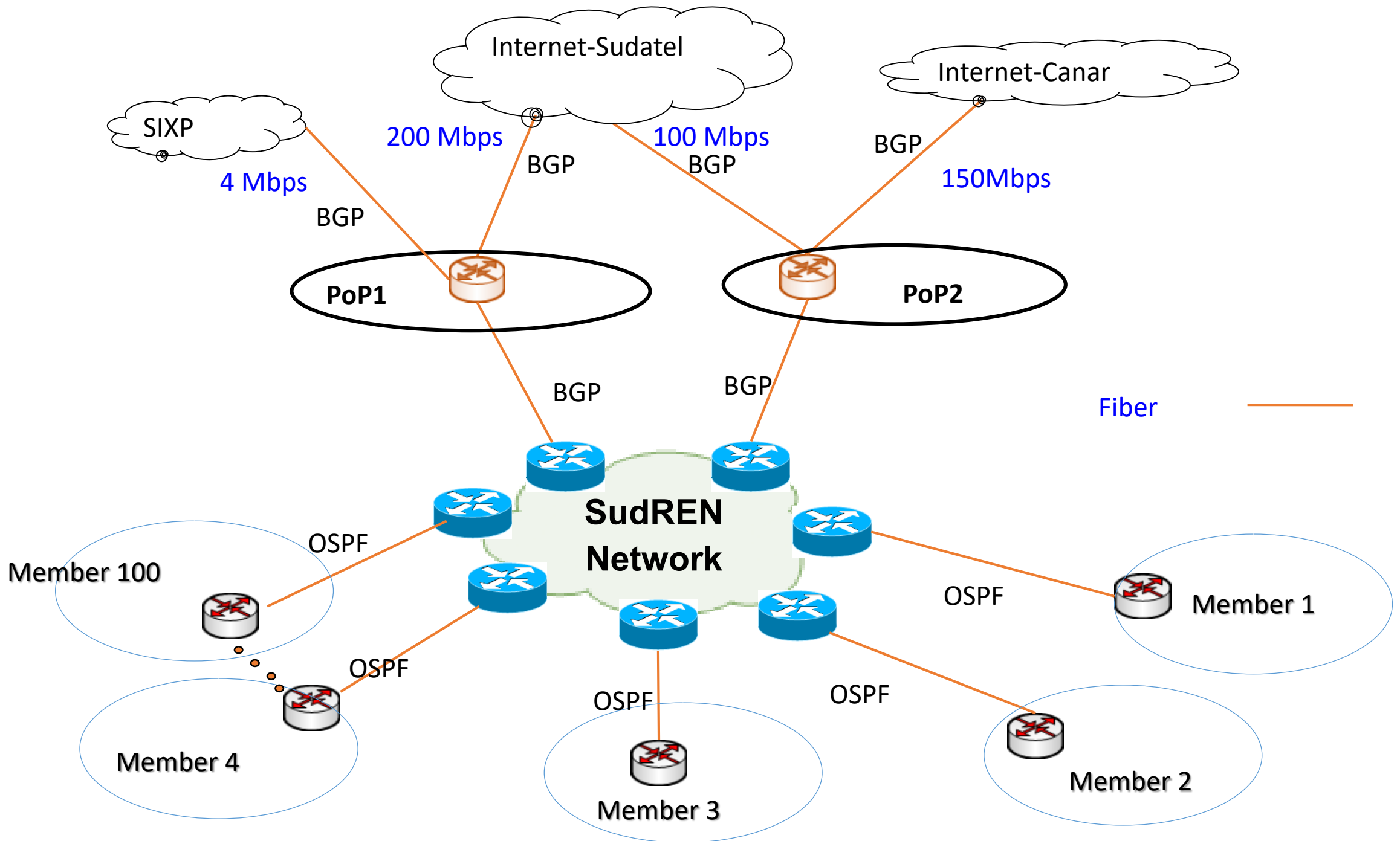
شبكة البحث العلمي والتعليم السودانية

SudREN at a Glance



- ✓ Sudanese Research and Education Network, NREN of Sudan
- ✓ SudREN is licensed ISP dedicated to the Sudanese research and educational intuitions.
- ✓ 3 STM-1 (450 Mb) Total Bandwidth to the upstream providers,
- ✓ 100+ Member Institution are connected via Layer-3 MPLS VPN on Local carries providers (Sudatel, Canar),
- ✓ SudREN has its own Numbering resources from
 - 41.67.0.0/18
 - 197.251.0.0/17
 - 2c0f:fec8::/32

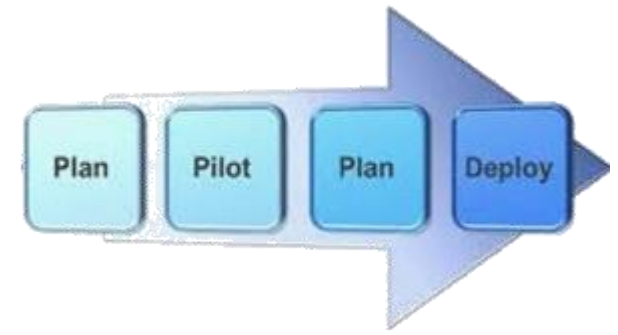




Resource Utilization

- SudREN has utilized about 90% of the 1st block and about 70% of the 2nd one.
- SudREN started to put a strategic plan in accordance with the National Migration Plan toward IPv6.

Migration Plan



Network Analysis:

Update the network inventory, key network equipment, servers, appliances and computers.

Define roadblocks:

Identify the main challenges and key issues that hinder the deployment of IPv6.

Workarounds:

Develop a transition plan with minimum impact on existing critical applications.

Final Plan:

Prepare a set of strategies covering IT equipment acquisition, new critical applications, manpower resource planning and network policies to prepare for fully enabled IPv6 Network

Evaluation of IPv6 Readiness

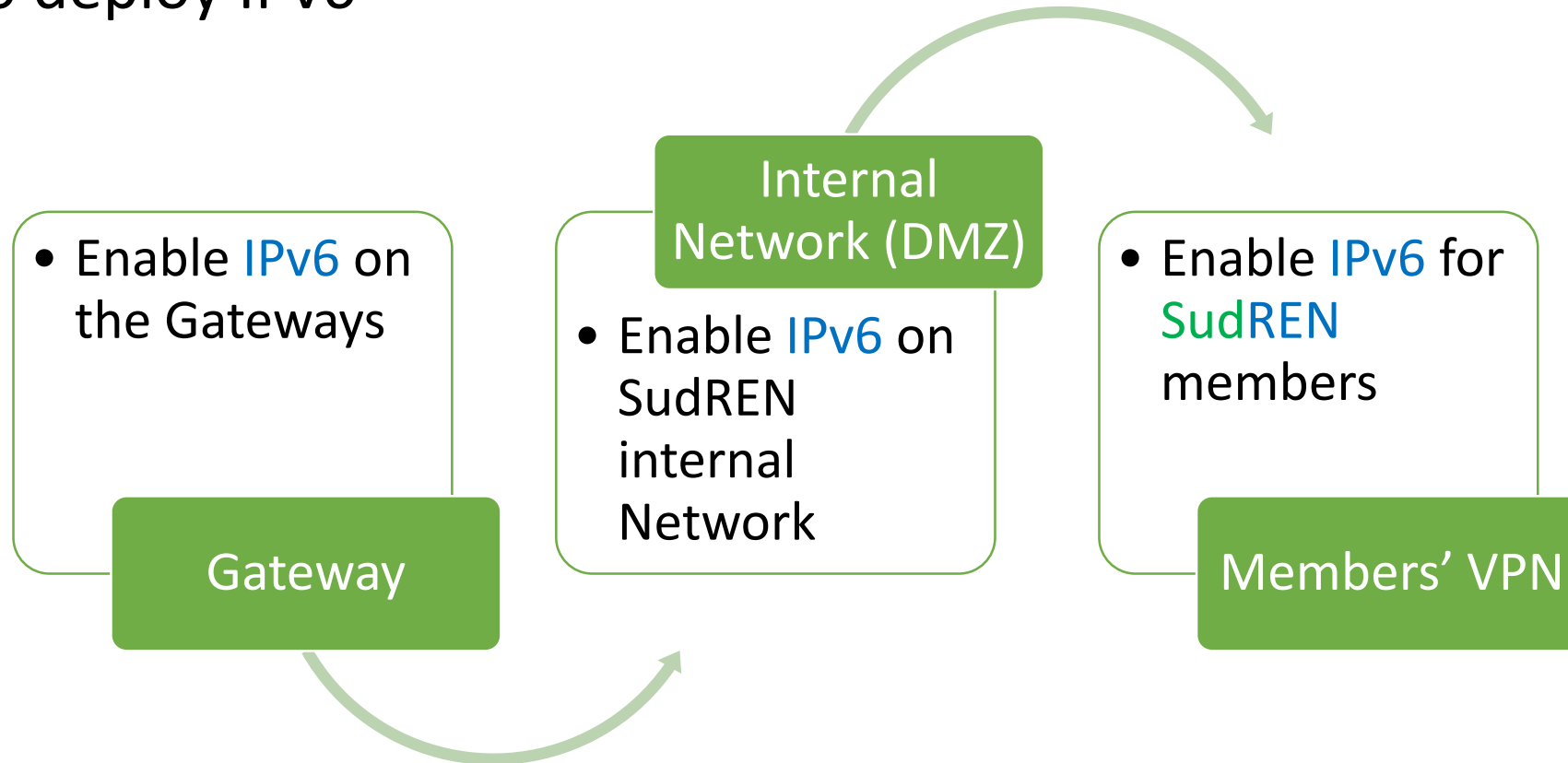
IPv6 Enabled equipment in SudREN

- ✓ IPv6 Block is already assigned `2c0f:fec8::/32`
- ✓ 50% of the POPs Routers
- ✓ 10% of Members Router
- ✓ 100% of Servers
- ✓ 60% of Applications



Deploying IPv6

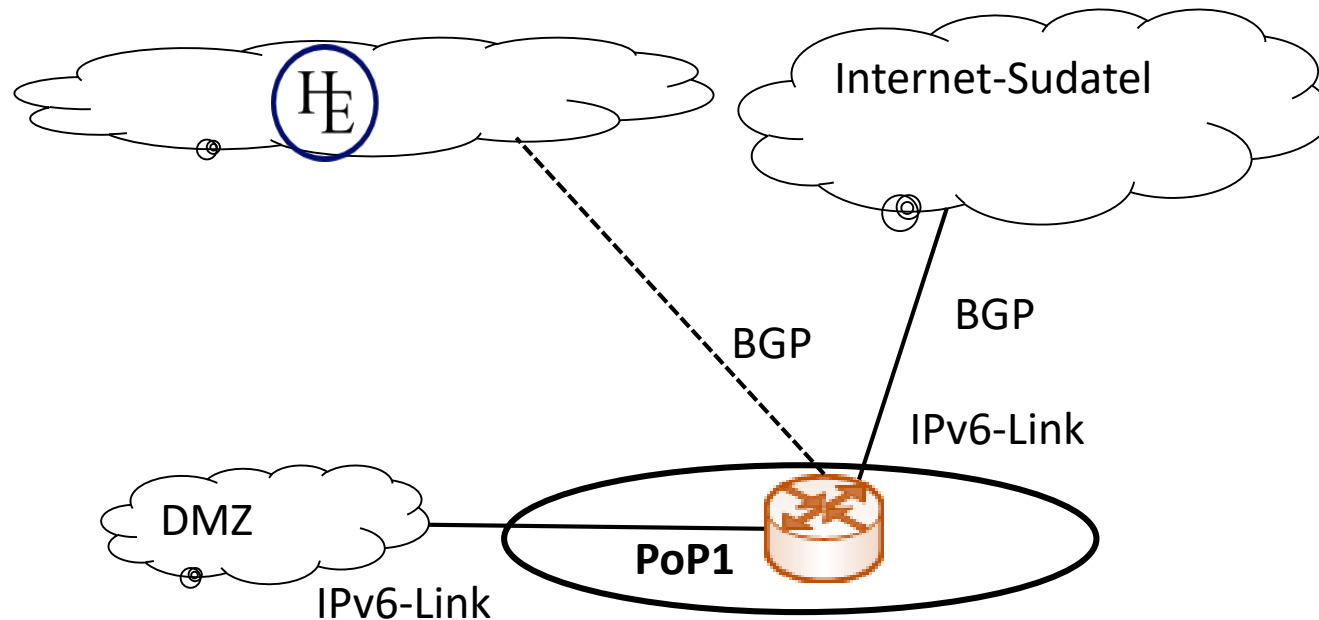
Steps to deploy IPv6



IPv6 in the Gateways

- **SudREN** has a native IPv6 link to the internet via (**Sudatel**)

- Redundancy Tunnel is also available through  **HURRICANE ELECTRIC
INTERNET SERVICES**



IPv6 Addressing

New IPv6 Addressing plan goals

- Improving routing aggregation.
- Minding future growth with contiguous address space.
- Hierarchical allocation “universities & campuses”
- Recognizing directly from the IPv6 Address what location/environment a network belongs to.
- Reflect the organization infrastructure..

Each members currently is assigned /48 IPv6 Address block, and reserved /40 for future demand.

SudREN started putting a strategy to extend its IPv6 block.

Achievements

<http://sudren.edu.sd/>



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عربي

connected via
IPv6



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★ QUICK LINK

- SudREN Running IPv6
- Members' Map
- Africa Connect
- Video Conference
- Hosting Services

★ SUDREN PORTAL

- How To Join Us
- SudREN Cloud
- SudREN Workshop
- Monitoring System

SudREN Running IPv6

On June 10th 2014 SudREN completed its IPv6 preparation and started announcing its prefixes to the world following its peers and other service providers taking the next step in IP Addressing....

[Readmore..](#)



فريق العمل السوداني
للإصدار السادس من بروتوكول الإنترنت

[Important Links](#) [Join our Mailing List](#) [Vision & Mission](#) [Welcome](#)

The Sudanese Research and Education Network (SudREN) is a specialized Internet Service provider dedicated to supporting the needs of the research and education communities within Sudan. SudREN is a non-profit entity operating under the umbrella of the Association of Sudanese Universities. All research and education institutions of Sudan are eligible to become members of SudREN.



11-SD-00000471



W1-SD-00004775

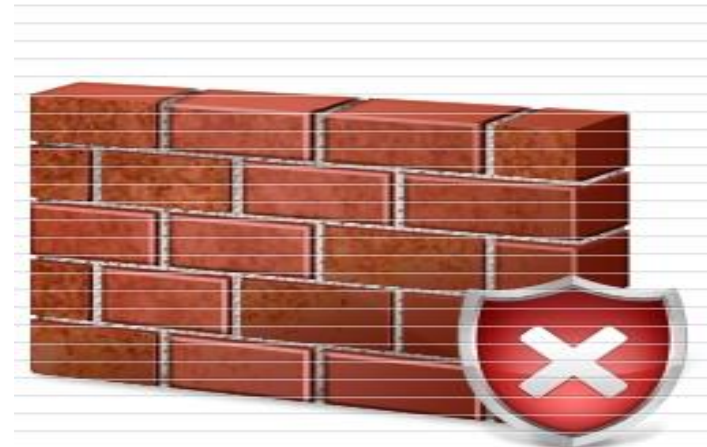
Achievements

ASN	AS Name	IPv6 Capable ▼	IPv6 Preferred	Samples
AS37197	SUDREN	25.29%	23.64%	5,013
AS15706	Sudatel	0.04%	0.04%	217,367
AS36998	SDN-MOBITEL	0.01%	0.00%	391,288
AS36972	MTNSD	0.00%	0.00%	212,481
AS33788	KANARTEL	0.00%	0.00%	33,049
AS37211	MAX-NET-FOR-INTERNET-SERVICES	0.00%	0.00%	6,400
AS36892	IPTECH	0.00%	0.00%	781
AS54334	ROYA - Roya Hosting LLC	0.00%	0.00%	24
AS0	Reserved (ietf)	0.00%	0.00%	1
AS0	Reserved (ietf)	0	0	1
AS54334	ROYA - Roya Hosting LLC	0	0	24

Challenges



- Coordination with local upstream providers,
- IPv6 is not supported in **some** members' routers,
- Limited **Redundancy** for IPv6 Connectivity in Our POPs,
- IPv6 is not fully supported in both POPs **Firewalls**.



For More Details

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Guidelines to the Implementation of National Integrated Strategic Plan to IPv6 Transition

Sami Salih, Jordi Palet Martínez, Latif Ladid, Sureswaran Ramadass

Abstract— The transition to IPv6 is having big time, since a considerable amount of Internet traffic is now carried over IPv6 packets. The transition process is no more an option to all ICT related businesses to reach transparently end-users who should not require updates or reconfiguration. To do so, a transition plan should be defined. The goal of the plan is to perform an efficient and smooth enough transition without interrupting the critical online services. This paper outlines the guidelines of an integrated strategic plan for the IPv6 transition nationwide for public administrations, and presents a case study of a country transition.

Index Terms— Dual-stack, ICT, Internet, IPv4, IPv6, Transition, Tunnel





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