The IPv6 Transition

ICANN Singapore

Hideo Ishii

Vice President, Product Strategy and Management, Pacnet

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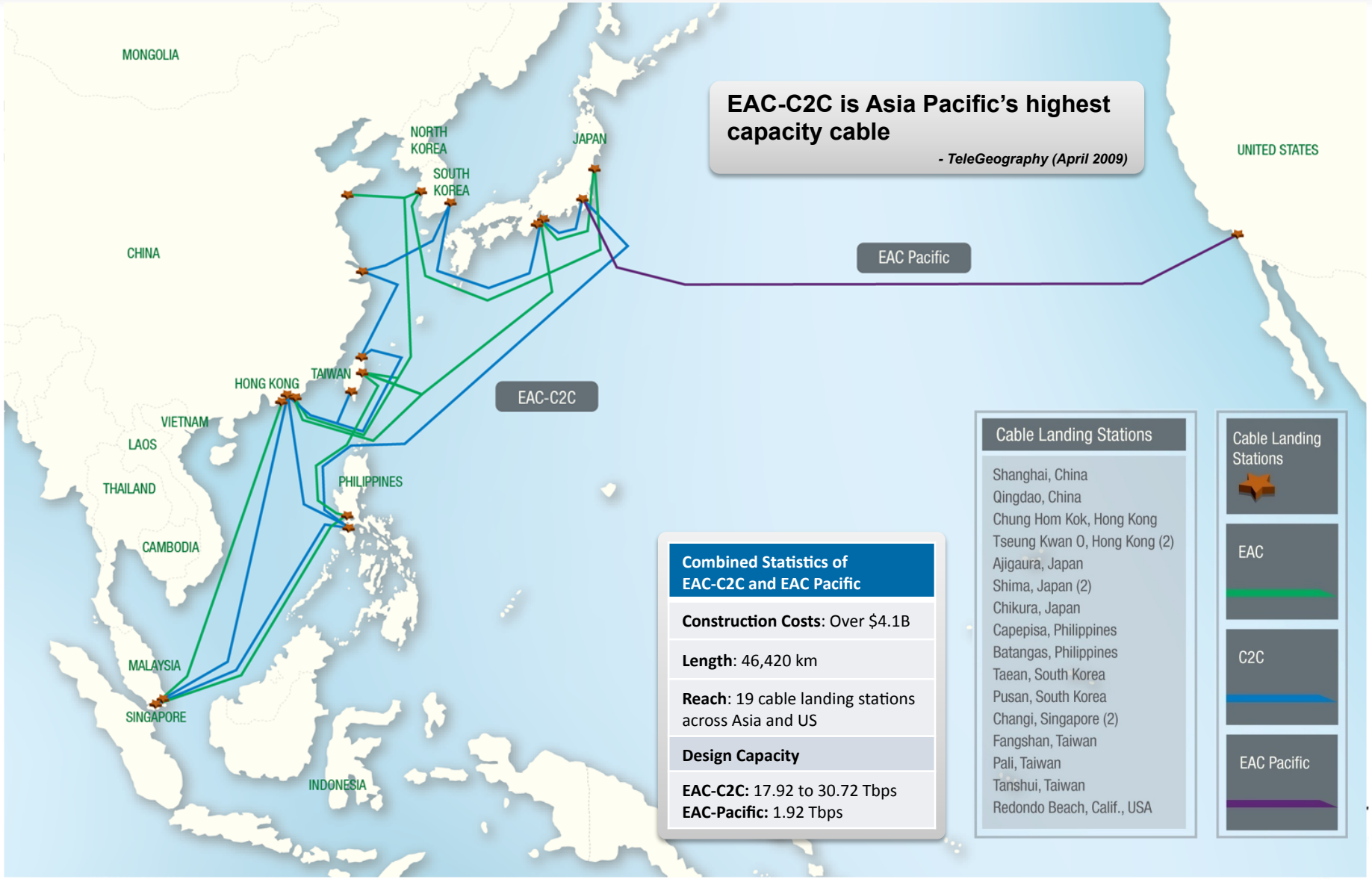
Introduction



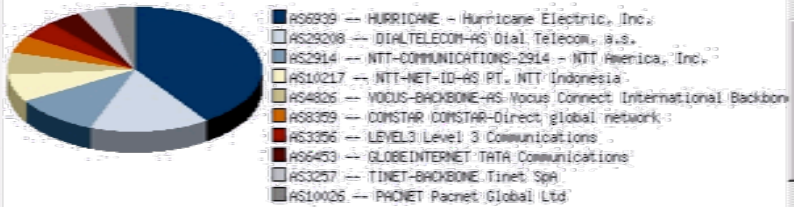
Introduction

Pacnet launched IPv4/IPv6 dual stack IP Transit service globally in 2010

Top 25 Transit/Upstream AS numbers in the routing table

This represents the number of distinct prefixes for which these AS's provide transit (i.e. are seen as upstream AS).

Transit/upstream AS number	AS description	number of prefixes
AS6939	HURRICANE - Hurricane Electric, Inc.	565
AS29208	DIALTELECOM-AS Dial Telecom, a.s.	212
AS2914	NTT-COMMUNICATIONS-2914 - NTT America, Inc.	150
AS10217	NTT-NET-ID-AS PT. NTT Indonesia	96
AS4826	VOCUS-BACKBONE-AS Vocus Connect International Backbone	89
AS8359	COMSTAR COMSTAR-Direct global network	62
AS3356	LEVEL3 Level 3 Communications	62
AS6453	GLOBEINTERNET TATA Communications	58
AS3257	TINET-BACKBONE Tinet SpA	53
AS10026	PACNET Pacnet Global Ltd	51
AS9002	RETN-AS ReTN.net Autonomous System	48
AS17832	SIXNGIX-AS-KR Korea Internet Security Agency	46
AS2516	KDDI KDDI CORPORATION	45
AS2497	IIJ Internet Initiative Japan Inc.	44
AS3549	GBLX Global Crossing Ltd.	44
AS7473	SINGTEL-AS-AP Singapore Telecommunications Ltd	43
AS6762	SEABONE-NET TELECOM ITALIA SPARKLE S.p.A.	41
AS1299	TELIANET TeliaNet Global Network	38
AS4635	HKIX-RS1 Hong Kong Internet Exchange--Route Server 1	36
AS17579	KREONET2-AS-KR Korea Institute of Science and Technology Information	34
AS17451	BIZNET-AS-AP BIZNET ISP	34
AS4713	OCN NTT Communications Corporation	29
AS1237	KREONET-AS-KR Korea Institute of Science	29



Source: http://www.bgpmon.net/weathermap.php?inet=6&focus=asia

IPv6 Transition - History

- Since 2001, Pacnet (previously Asia Global Crossing) has been looking at IPv6 deployment globally
- The first step was using a “GRE tunnel” solution for eBGP & static (to customer) and iBGP (Backbone)
- 2003-2007: Looking at IGP and OS under native IPv6 / IPv4 dual stack
- 2008: Pacnet deployed native IPv6/IPv4 network globally
- 2010 – 2011: Pacnet domestic IP networks (Singapore, Australia and Hong Kong) deployed native IPv6/IPv4 dual stack

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IPv6 Transition Steps: The Network Perspective

1. Enable GRE (IPv6 over IPv4) tunnel between IPv6 enable routers to exchange IPv6 routes and for IPv6 transport
2. Deploy IPv6 IGP (Interior Gateway Protocol) and BGP (Border Gateway protocol) partially as minimum implications
   - Partial Dual Stack
3. Deploy IPv6 IGP and BGP globally
   - Completely Dual Stack

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IPv6 Transition Steps: The Operations and Provisioning Perspective

- IPv6 was a trial service for a long time (a few years ago)
  - Operation and provisioning were best effort
  - Provided Email interface only
- IPv6 training
  - Asked venders to do IPv6 technical and operational training
    - Allow them to login to “test lab” routers to do hands-on training
- IPv6 commercial documents
  - Updated the documents / processes so that backend staff can support IPv6 orders smoothly

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Objectives

- Provide IPv6 connectivity
  - Need IPv6 address from APNIC
  - Need IPv6 full routes
  - Need IPv6 peering sessions globally
  - Need IPv6 numbering plan
  - etc..

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Objectives, con't

- **NO SERVICE IMPACT!**
  - 6PE (MPLS) vs. IP routing
    - Simply IP Routing
  - IS-IS multi-Topology vs. OSPFv3
    - IS-IS Multi-Topology chosen after long term evaluations at test lab
  - Traditional BGP vs. address-family (Cisco)
    - Moved to address-family IPv4 and IPv6

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Observations

- Lack of traffic… around 0.03%
  - e.g. IPv6 : 3Mbps vs. IPv4 : 10,000Mbps
- Lack of customer demand
  - Perhaps issue of marketing and sales pitch ??
- Routing Optimization is not completed
  - Observed during W6D….reach to US Tier-1 site… SG->JP->US->DE->FR->US and 6 AS Hops

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Observations, con't

- Monitoring tools (like MRTG) need special configuration to poll IPv6 traffic statistics
  - Apply filter to collect IPv6 traffic data
  - Create policy-map to collect IPv6 traffic data
- Netflow v9 can collect flow data of IPv6
  - Need to upgrade from particular IOS to XR
- Should BGP related policy be similar to IPv4?

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Observations, con't

- A variety of IPv6 demand in the Asia-Pacific region
  - Demands also varies across market segments
- Who will be IPv6 Tier-1 ?
- We need a deep dive into the IPv6 requirements of broadband customers in Hong Kong, Singapore and Australia
- Data Center and Hosting customer demands
  - What is the new budget that is needed to meet the demands from them?

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