MIGRATION to IPv6

MTNL PLAN & PERSPECTIVE
<table>
<thead>
<tr>
<th></th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>(a)</td>
<td>IPv6 migration is a complex issue and need joint effort.</td>
</tr>
<tr>
<td>(b)</td>
<td>Deptt. of Telecom/Deptt. of IT/Govt. should initiate to set up IPv6 test bed.</td>
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<tr>
<td>(c)</td>
<td>Set up National Internet Registry.</td>
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<tr>
<td>(d)</td>
<td>Conduct training and awareness programme.</td>
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<tr>
<td>(e)</td>
<td>Upgrade cost do not allow one time upgradation and life cycle upgrade is the feasible option.</td>
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</table>
IP BASED NETWORK/SERVICES INFRASTRUCTURE IN MTNL

- ISP PoPs, Internet access.
- MPLS, L2/L3 VPNs, Multicast, QoS.
- Broadband access – XDSL, Metro Ethernet, 3G.
- Wireless – Network, 3G services, GPRS.
- NGN (C4)
- CPEs – DSL CPEs, STBs, IP phones, Soft Clients.
- OSS/BSS : DNS, DHCP, AAA (RADIUS), NMS, PMS, WSC, Billing & CRM.
- Services : IPTV, VOIP, VASs.
IPv6 MIGRATION CHALLENGES

- How to define IPv6 migration Timeframe/Roadmap.
  - IPv4 based equipment still being manufactured/supplied.

- How to test/assess the equipment/services for:
  * Conformance to IPv6 features & protocols.
  * Security
  * Mobility
  * Interoperability

- How to evaluate IPv6 effect in terms of costs involved/ROI and disruption etc.
IPv6 MIGRATION PLAN

- IPv6 Procurement Plan.
- IPv6 Deployment strategy.
- Networks/Services component testing.
- Network & Service Integration.

- Exceptional strategy.
- Integration Plan
- Security Plan finalization.
- Actual Implementation.

*IPv4 and IPv6 to co exist for some time and migration to happen only as life cycle upgrade of the products*
IPv6 PROCUREMENT PLAN

MTNL had decided (>3 years back) that all hardware, software, and Application being procured, shall be IPv6 compliant and accordingly adhering to it for all procurements:

- How to ensure?
  - Requires mandate for the vendors.
  - Requires incentive such as tax relief to vendors to manufacturer IPv6 compliant hardware/software/application.
IPv6 DEPLOYMENT STRATEGY

Architectural Solutions:

- Native IPv6.
- Dual Stack.
- Tunnelling.
- Protocol translation
- 6PE, 6VPE.

“MTNL to finalize after assessment/testing of the assessment of available features on Edge & Core routers and access NW components”
TESTING

- Testing for -
  - Conformity – to IPv6 technology and protocols.
  - Performance – i.e. throughput, latency, packet loss /processing and memory requirement etc.
  - Security, Mobility, QoS requirements.
  - Inter-operability.

- Components to be tested -
  - Edge routers and core routers
  - Components of access network and other NW islands.
  - Application software and services.

*Test Bed Required.*
## IP ADDRESSING

- Obtain IPv6 Address Block/IPv6 suffix from the centralized (national/Regional) Internet Registry.

  *Set up National Internet registry?*

- Develop Addressing Plan and formulate Address Distribution mechanism to customers.
NETWORK & SERVICES INTEGRATION

- Analyse various Network/Systems and services for IPv6 compliance and migration roadmap.
- IPv6 exception strategy – identification of components (HW/SW/Services) that will remain IPv4.
- Integrate progressively the existing/new IPv6 compliant network Island(s) with IPv6 compliant, Transport N/W

High level analysis of NWs/services for IPv6 compliance and identification of components that will remain IPv4 is underway - migration to IPv6 only as the life cycle upgrade
SECURITY PLAN


- Security requirements.
  - Does the NW support IPv6 based slated reference extended ACL.
  - Server connectivity e.g
    - Support IP Sec.
    - Protocol authentication for OSPF V.3
  - IPv6 IP Sec terminal, router-to-router.
  - IPv4/IPv6 Encryption Hardware adapter.
  - Mobile IP authentication.

- IPv6 Firewall
  - Does the FW support IPv4/IPv6.
  - Security Application.

**TEST BED REQUIRED**
## HIGH LEVEL NW/SERVICES ANALYSIS

### MPLS TRANSPORT (CORE & AGGREGATION)

<table>
<thead>
<tr>
<th>Component</th>
<th>Status</th>
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<tbody>
<tr>
<td>PE &amp; P routers</td>
<td>IPv6 compliant (to be verified)</td>
</tr>
<tr>
<td>Aggregation/CE</td>
<td>IPv6 compliant (to be verified)</td>
</tr>
<tr>
<td>eMS/NMS</td>
<td>To be tested for IPv6 compliance &amp; inter-operability / to be upgraded required</td>
</tr>
</tbody>
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## ISP NETWORK

<table>
<thead>
<tr>
<th>Component</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway Router</td>
<td>IPv6 compliant (to be verified)</td>
</tr>
<tr>
<td>Web Server/Caching Server</td>
<td>To be verified/ upgraded.</td>
</tr>
<tr>
<td>Messaging/ Security/ Firewall/</td>
<td>Under replacement by IPv6 compliant Hardware/Software as part of planned upgrade.</td>
</tr>
<tr>
<td>DNS</td>
<td></td>
</tr>
<tr>
<td>ISP/LL routers/ switches</td>
<td></td>
</tr>
<tr>
<td>Narrow band RAS</td>
<td>Shall remain IPv4 island</td>
</tr>
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*ISP NW to evolve to support both IPv4 and IPv6 versions at the same time (dual stack approach)*
**BROADBAND ACCESS (xDSL & Metro Ethernet)**

<table>
<thead>
<tr>
<th>Component</th>
<th>Requirement</th>
</tr>
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<tbody>
<tr>
<td>BRAS, Tier 1 &amp; Tier 2 switches, MES, ME-CPEs</td>
<td>IPv6 compliant (to be verified)</td>
</tr>
<tr>
<td>DSLAM &amp; DSLAM CPEs</td>
<td>To be verified for IPv6 compliance else shall remain IPv4 island and tunnelling used in access.</td>
</tr>
<tr>
<td>eMS &amp; NMS system</td>
<td>IPv6 compliant (to be verified)</td>
</tr>
<tr>
<td>Policy Control (SSSC)</td>
<td>To be upgraded to IPv6.</td>
</tr>
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## WIRELESS BROADBAND

(a) **Soft Switch (3G)**: To be tested for IPv6 compliance else upgraded to IPv6 / retained as IPv4 islands and replaced as life cycle upgrade of their networks/systems.

<table>
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<tr>
<th>TMG/SGW GGSN (GPRS)</th>
<th>To remain as IPv4 islands. GGSN to be replaced as life cycle upgrade</th>
</tr>
</thead>
</table>

(b) **CDMA (PDSN)**: To remain as IPv4 islands
| Soft-switch and other components. | To be tested for IPv6 compliance & upgraded to IPv6 if required. |
## VOICE OVER IP (VOIP)

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td><strong>IPv6 Readiness for</strong></td>
<td>-</td>
</tr>
<tr>
<td><strong>SIP Server</strong></td>
<td>To be ensured from Service Partner.</td>
</tr>
<tr>
<td><strong>OSS – DHCP, DNS, NMS</strong></td>
<td>To be ensured from Service Partner.</td>
</tr>
<tr>
<td><strong>BSS</strong></td>
<td>Convergent Billing to be used after due testing.</td>
</tr>
<tr>
<td><strong>IP Phone / PC Soft client</strong></td>
<td>?</td>
</tr>
</tbody>
</table>
IPTV

IPv6 readiness for –

- Head End. Equipment: Service Partner to ensure.
- Metro Ethernet, XDSL, access and CPE / STB: To be verified for IPv6 compliance else shall remain IPv4 island and tunnelling used in access.
- OSS / BSS: Convergent Billing & CRM to be used after due testing and integration.
## OSS/BSS MIGRATION PLAN

- **AAA for dial-up & Broadband on IPv6**: Upgrade to IPv6 compliant system.

- **Mediation/ Billing/ Provisioning/ CRM/Web Selfcare**: Migration to/use of Convergent Billing & CRM system test upgrade.

- **DNS (which understands IPv4 A record and IPv6 AAAA record)**: To be Upgraded

- **Legal Interception**: To be assessed and upgraded.

- **Policy Control (SSSC)**: To be upgraded.

- **NMS to be tested and evolution planned to cater for following**:
  - Network Management evolution needs to be done before IPv6 deployment strategy.
  - System / Application / Protocol to be considered.
  - In a Dual Stack Network, both IPv4 & IPv6 environment must be managed with best optimization to decrease cost of operation.
SUMMARY

- Defining Migration Roadmap is a challenge - availability of IPv6 compliant equipment is still issue. Supply of IPv6 compliant equipment (from a given date) should be mandated.

- IPv6 Test bed - Deptt. of IT / DOT (TEC) / Govt. to take up challenges.

- Setting up of National Internet Registry – Govt / DoIT to decide

- IPv6 address allocation – Govt. / DOIT to take challenge.

- IPv6 Awareness & Training Programmes – need to be conducted.

- MTNL shall upgrade Network/system components only as life cycle upgrade.
THANK YOU