Measuring the Health and Resilience of the Internet: Malaysia
• Launched December 2020.

• We curate Internet measurement data from trusted sources to help everyone gain deeper, data-driven insight into the Internet.

**Trusted data from multiple sources:**

• **Benefit:** Helps to assess whether efforts to ensure that the Internet remains open, globally connected, secure, and trustworthy are working.

• **Benefit:** Allows policymakers, researchers, journalists, network operators, civil society groups, and others to better understand the health, availability, and evolution of the Internet.

pulse.internetsociety.org
Pulse Data Partners

- Data is provided by our trusted data partners
Pulse tracks

**Shutdowns:** Where do Internet Shutdowns take place and what is the economic cost?

**Technologies:** What is the state of deployment of technologies critical for the evolution of the Internet?

**Concentration:** How much are services concentrated in the hands of a few?

**Resilience:** How robust is the Internet ecosystem?
What I’ll cover today

**Shutdowns**: Where do Internet Shutdowns take place and what is the economic cost?

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**Concentration**: How much are services concentrated in the hands of a few?

**Resilience**: How robust is the Internet ecosystem?

**Country Reports**: Consolidate and illustrate critical Internet health metrics
Technologies
## Technologies Globally

<table>
<thead>
<tr>
<th>Technology</th>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTPS</td>
<td>96%</td>
<td>Current percentage of top 1000 websites globally that support HTTPS.</td>
</tr>
<tr>
<td>IPv6</td>
<td>48%</td>
<td>Current percentage of top 1000 websites globally that support IPv6.</td>
</tr>
<tr>
<td>TLS 1.3</td>
<td>81%</td>
<td>Current percentage of top 1000 websites globally that support TLS 1.3.</td>
</tr>
</tbody>
</table>
IPv6 Adoption in SE Asia

IPv6 adoption

Avg IPv6 Adoption = 29%
Resilience
The framework collates around 30 sets of public metric data that relate to **four pillars** of a resilient Internet:

- **Infrastructure**: The existence and availability of physical infrastructure that provides Internet connectivity.
- **Performance**: The ability of the network to provide end-users with seamless and reliable access to Internet services.
- **Security**: The ability of the network to resist intentional or unintentional disruptions through the adoption of security technologies and best practices.
- **Market Readiness**: The ability of the market to self-regulate and provide affordable prices to end-users by maintaining a diverse and competitive market.

Overall Internet Resilience — By Region

Europe: 60%
Asia: 46%
Americas: 45%
Oceania: 45%
Africa: 35%
Overall Internet Resilience — Asia

South-Eastern Asia: 49%
Eastern Asia: 49%
Western Asia: 47%
Southern Asia: 43%
Central Asia: 39%
Overall Internet Resilience — South East Asia

- **Singapore**: 72%
- **Viet Nam**: 52%
- **Brunei Darussalam**: 51%
- **Malaysia**: 51%
- **Thailand**: 51%
- **Indonesia**: 48%
- **Philippines**: 46%
- **Myanmar**: 45%
- **Cambodia**: 43%
- **Lao PDR**: 42%
- **Timor-Leste**: 38%
Malaysia– Internet Resilience Index

Infrastructure
- Cable ecosystem: 40%
- Mobile connectivity: 75%

Enabling infrastructure
- Data centers: 22%
- Number of IXPs: 9%

Performance
- Fixed networks: 62%
- Mobile networks: 46%

Security
- Enabling technologies: 40%
- Domain name system security: 60%
- Routing hygiene: 59%
- Security threat: 77%

Market readiness
- Market structure: 49%

Market data source: Pulse Internet Resilience Index
Growth of IXPs in SE Asia, 2018-23
Number of Data Centers, 2023

Source: Cloudscene • September 2023
Overall Internet Resilience — South East Asia

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Security Resilience — South East Asia

Security

Overall Resilience  Infrastructure  Performance  Security  Market Readiness

Singapore
74%

Myanmar
71%
+6

Lao People’s Democratic R
67%
+7

Viet Nam
63%

Malaysia
63%

Thailand
61%

Indonesia
59%
-1

Cambodia
55%
+1

Philippines
54%
-2

Timor-Leste
50%
+1

Brunei Darussalam
46%
-8

Orange Restricted
# The Internet Resiliency Index — Security

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Security Threat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabling technologies</td>
<td>Secure Internet Servers, Source: World Bank</td>
</tr>
<tr>
<td>DNSSEC</td>
<td>DDoS Protection, Source: Cybergreen</td>
</tr>
<tr>
<td>Routing hygiene</td>
<td>Global cybersecurity index score, Source: ITU</td>
</tr>
</tbody>
</table>

**Secure web traffic** (Webpage loads using HTTPS. Source Mozilla)

**IPv6 adoption**, Source APNIC Labs

**DNSSEC adoption**, i.e., is ccTLD signed. Source: ICANN

**DNSSEC validation**, i.e., Users validating DNSSEC. Source: APNIC Labs

**MANRS score**, Source: MANRS

**Upstream redundancy**, i.e., Avg # of upstream providers. Source: CAIDA

**Global cybersecurity** index score. Source: ITU
Enabling Technologies
Enabling Technologies

- Secure web traffic
- IPv6 adoption

Percentage

BN, KH, ID, LA, MY, MM, PH, SG, TH, TL, WN
DNSSEC

DNSSEC adoption • DNSSEC validation

Avg DNSSEC Validation = 35.6%
Routing Hygiene

---

Routing hygiene

- BN
- KT
- ID
- LA
- MV
- MH
- PH
- SG
- TH
- TL
- VN

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Routing Hygiene

MANRS - Upstream redundancy
Security Threats

Security threat
Security Threats

- DDoS protection
- Global cybersecurity
- Secure Internet servers
Country Reports
Open Internet Environment

**Internet Use**
Individuals using the Internet as a percentage of the total population

- 97%
- Regional Rank: 7
- 71%
- Asia avg.

**Internet Resilience Score**
A resilient Internet connection is one that maintains an acceptable level of service in the face of faults and challenges to normal operation

- 51%
- Regional Rank: 11
- 46%
- Asia avg.

**IXP Operator Market**
A measure of the diversity and concentration of the local market for Internet Exchange Point operations

- 8%
- 91%

**Retail ISP Diversity**
Diversity of retail Internet providers improves resilience and user choice

- Very Good

**Transit Provider Diversity**
More diversity in routes to the global Internet improves connection resilience

- Poor

**Internet Freedom**
Freedom on the Net measures Internet freedom in 70 countries

- Partly Free

See details on freedomhouse.org
Open Internet Environment

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Retail and Transit Provider Diversity

### Neighboring ASNs in Malaysia

<table>
<thead>
<tr>
<th>AS</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS4788</td>
<td>63</td>
</tr>
<tr>
<td>AS8900</td>
<td>62</td>
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<tr>
<td>AS6899</td>
<td>53</td>
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<td>AS4832</td>
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<td>AS6852</td>
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<td>AS5780</td>
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<td>AS3808</td>
<td>6</td>
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<tr>
<td>AS4826</td>
<td>6</td>
</tr>
<tr>
<td>AS3002</td>
<td>6</td>
</tr>
</tbody>
</table>
Globally Connected Infrastructure

**Networks Assigned**
A measure of how many Internet networks are active here
- 364
  - Regional Rank: 15
- 597
  - Asia avg.

**Addresses Assigned IPv6**
A measure of how many Internet addresses are assigned here
- 11.1M
  - Regional Rank: 26
- 152.2M
  - Asia avg.

**IPv6 Adoption**
Enabling the Internet to support more users and more uses
- 64%
  - Regional Rank: 2
- 19%
  - Asia avg.

**Internet Exchange Points**
IXPs help strengthen local Internet connectivity, develop local Internet industry, improve competitiveness, and serve as a hub for technical activity
- 5
  - Regional Rank: 12
- 6
  - Asia avg.

**Addresses Assigned IPv4**
A measure of how many legacy addresses are assigned here
- 6.7M
  - Regional Rank: 14
- 17.6M
  - Asia avg.

**Peering Networks**
Peering networks help to keep Internet traffic local, provide faster connections, and improve the experience of the people relying on them
- 128
  - Regional Rank: 8
- 120
  - Asia avg.
Globally Connected Infrastructure

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- **128**
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- **120**
  - Asia avg.
50/50 Vision - Working together to keep half of all traffic local

Domain Count [Total 5816]
Peering in Malaysia  Analysis coming

**Malaysia** Visible IPv4 Interconnections
236 interconnections among 238 Autonomous Systems

**Thailand** Visible IPv4 Interconnections
272 interconnections among 402 Autonomous Systems

Source: https://rex.apnic.net/as-interconnections
Peering in Malaysia  Analysis coming

Malaysia Visible IPv4 Interconnections
236 interconnections among
238 Autonomous Systems

Singapore Visible IPv4 Interconnections
588 interconnections among
433 Autonomous Systems

Source: https://rex.apnic.net/as-interconnections
Peering in Malaysia

**Malaysia** Visible IPv4 Interconnections
236 interconnections among
238 Autonomous Systems

**Australia** Visible IPv4 Interconnections
1843 interconnections among
1660 Autonomous Systems

Source: https://rex.apnic.net/as-interconnections
Secure and Trustworthy Internet

Naming Security Status
Adopting DNSSEC improves trustworthiness of Internet communications

Naming Security Coverage
A measure of how much local web content supports DNSSEC for improved trustworthiness

Naming Security Adoption
A measure of how much local Internet users are protected by DNSSEC

Routing Security Coverage IPv4
One measure of how much local Internet network providers are securing their infrastructure

Routing Security Adoption
A measure of how much local Internet providers are checking validity of connectivity information they receive from other networks

Routing Security Coverage IPv6
One measure of how much local Internet network providers are securing their infrastructure

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## Secure and Trustworthy Internet

### Naming Security Status
Adopting DNSSEC improves trustworthiness of Internet communications

- **.my**
  - Active

### Naming Security Coverage
A measure of how much local web content supports DNSSEC for improved trustworthiness

- 0%
  - Regional
  - Rank: 7
  - 1%
  - Asia avg.

### Naming Security Adoption
A measure of how much local Internet users are protected by DNSSEC

- 19%
  - Regional
  - Rank: 32
  - 37%
  - Asia avg.

### Routing Security Coverage IPv4
One measure of how much local Internet network providers are securing their infrastructure

- 90%
  - Regional
  - Rank: 19
  - 73%
  - Asia avg.

### Routing Security Adoption
A measure of how much local Internet providers are checking validity of connectivity information they receive from other networks

- 0%
  - Regional
  - Rank: 43
  - 15%
  - Asia avg.

### Routing Security Coverage IPv6
One measure of how much local Internet network providers are securing their infrastructure

- 74%
  - Regional
  - Rank: 29
  - 73%
  - Asia avg.
Secure and Trustworthy Internet

Routing Security Coverage IPv4
One measure of how much local Internet network providers are securing their infrastructure

- 88%
  - Regional Rank: 23
  - 73% Asia avg.

Routing Security Coverage IPv6
One measure of how much local Internet network providers are securing their infrastructure

- 83%
  - Regional Rank: 20
  - 73% Asia avg.

Routing Security Adoption
A measure of how much local Internet providers are checking validity of connectivity information they receive from other networks

- 37%
  - Regional Rank: 7
  - 15% Asia avg.

Naming Security Status
Adopting DNSSEC improves trustworthiness of Internet communications

.mm Active

Naming Security Adoption
A measure of how much local Internet users are protected by DNSSEC

- 67%
  - Regional Rank: 11
  - 37% Asia avg.
Limitations
Limitations

- The data is pulled from external public sources, not always up-to-date.
  - An indicator is not included if data is missing on more than 25% of countries in the Index.

- Without in-country measurements, it’s difficult to validate the data.
  - RIPE Atlas and OONI are doing great work in this area, but more is needed.

- Some of the data undergoes processing, normalization, and weighing, we use a methodology that is reproducible.
  - You can see raw numbers via API. Email us for access pulse@isoc.org

- Ultimately, the Index benchmarks countries with one another and helps decision makers recognize gaps and weaknesses to conduct further study into validating these and work towards addressing them.
We all have a role to play
Take aways

• Understanding what’s happening upstream and beyond your borders is equally important as knowing your network’s health.

• Having an insightful national measurement system in place improves the resolution of the health of the edge.

• Your network's health and the health of the whole of Asia Pacific's Internet are interconnected. We all have a role to play to make sure it is robust and secure.
Take aways

• Suggested areas to improve resilience include:
  • Improved localized peering infrastructure and promoting localized content (ccTLD)
  • Greater transit provider diversity
  • Improved security resilience, particularly HTTPS and DNSSEC validation and to a lesser extent DDoS protection
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Contribute to Pulse pulse@isoc.org
Thank you

Robbie Mitchell
mitchell@isoc.org