

A policy framework for enabling Internet access



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Introduction

The Internet Society's goal is to make the Internet for everyone, everywhere. This supports one of the aims of United Nations Sustainable Development Goals; to achieve universal and affordable access to the Internet.¹ Already, the Internet has reached over 3 billion users. However, in spite of the increasing availability of the Internet around the world, still just 43% of the global population has Internet access.² Of even greater concern is that the rate of Internet access growth is slowing down.

If gaps persist between those who access the Internet's opportunities and those who do not, there is a risk of increased social and economic inequality. In order to achieve the goal of affordable Internet access for everyone, all stakeholders, including governments, will need to renew their focus and commitment. This document provides a policy framework to guide policymakers on how to bring Internet access to everyone.

There are two gaps in Internet adoption that need to be addressed: Those for whom access is still not available, and those who could access the Internet, but choose not to.

To connect the rest of the world's population who are still unconnected, policymakers need to address two key questions:

- How to extend Internet access to people not currently covered by Internet infrastructure?
- How to attract online those who could access the Internet, but choose not to?

Ten years ago, policy-makers focused largely on infrastructure. There were few submarine cables connecting developing regions to the global Internet, and few fixed lines to enable Internet access nationally. As a result, access was scarce, high-cost, and

low-quality. Today the cost of access continues to fall, and at least 70% of the world's population lives within range of a mobile Internet signal. This shows that in many countries, infrastructure policies have been successful. The arrival of mobile technologies which cost less to deploy and have allowed competition to flourish, has also helped to drive access.

Where deployment costs are high or incomes very low, however, governments should help to lower costs and promote private investment. Where investment is unlikely to take place, such as in underdeveloped rural areas, governments need to invest to provide access and encourage future competition.

Simply focusing on expanding access infrastructure is not sufficient, however. People need to get online in order to enjoy content and services and expand opportunities for empowerment and development. Surveys of non-users show that in many countries cost and availability are no longer the top barriers to going online. Rather, non-users often indicate that what stands in the way is a lack of online skills and low interest in what the Internet has to offer.³ To make sure everyone can and does access the Internet, the focus needs to broaden from simply increasing the supply of Internet access to also boosting demand.

To drive adoption, governments also need to promote the provision of compelling and locally available online content and services. This requires infrastructure to host and deliver content locally, an Internet Exchange Point (IXP) to keep content local, and supporting and encouraging entrepreneurs and developers to generate content and services that meet local demand. These and other steps below will create a flourishing local Internet ecosystem that is more than just a user base for international content. To ensure their country enjoys the full range of opportunities and benefits the Internet offers, policymakers should promote not just *consuming* Internet content and services, but *creating* them.

The next wave of policies must ensure adoption catches up with availability, and promote the creation of content and services, and not just their consumption.

About this framework

A strong enabling environment for the Internet promotes universal and affordable access and the content, services, and skills that improve people's lives.

This policy framework provides recommendations policymakers can use to flexibly create their own Internet-enabling environment. Drawing on the Internet Society's experience around the world, interactions with members and national chapters, and based on evidence from our research⁴, this policy framework shows how to support increased investment, adoption and use of the Internet.

The recommendations can be applied to each country's unique situation across three linked areas:

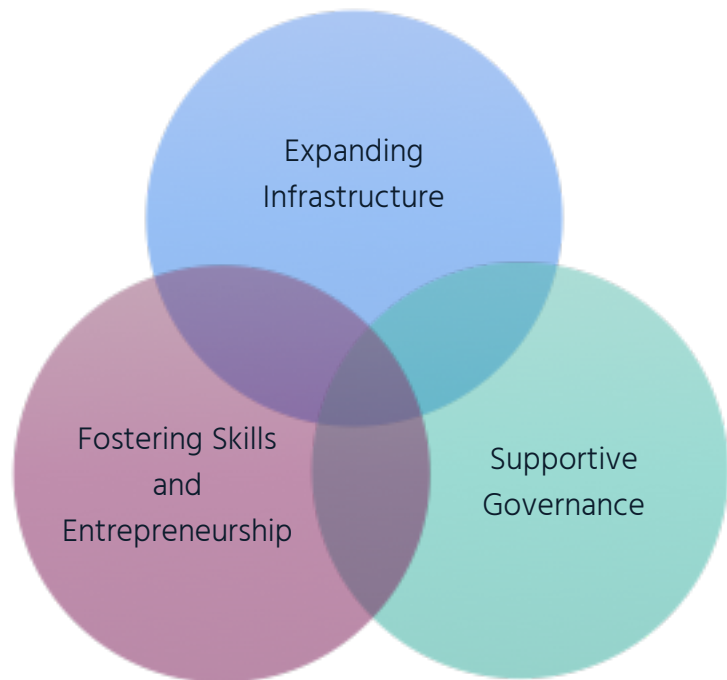
1. **Expanding Infrastructure,**
2. **Fostering Skills and Entrepreneurship,** and
3. **Supportive Governance.**

These overlapping areas highlight that the enabling environment is built on the collaboration of three broad groups of stakeholders:

Private sector. Investment is needed for the infrastructure to provide Internet access and to create and host content and services, leaving governments to prioritize areas with high costs or low demand.

People. A skilled technical community is necessary to deploy and operate access and content infrastructure. It is also necessary to develop human capacity so that there are entrepreneurs, developers and others to create content and services and the innovative new business and delivery models built on them.

Government. Good governance is needed to set the principles and rules of an enabling environment for a local Internet ecosystem, and specific policies to promote infrastructure investment and human capacity. Governments can also deploy their own content and services and encourage people to make the most of the Internet.



1. Expanding Infrastructure

To give everyone access to reliable Internet, there must be enough bandwidth for new offerings, and efficient local interconnection. Governments have a key role in promoting private investment and, where private investment is unlikely, to provide public investment to ultimately increase choice and competition.

In many countries, the availability of access now outpaces the rate of adoption. One reason is a lack of locally relevant content and services, and that content is hosted abroad where it is cheaper, but much slower to download. Getting the next 57% of people online means understanding the interaction between connectivity, cost, content and services. Policymakers need to widen the focus from access infrastructure to include content infrastructure, such as data centers and content delivery networks, and support the ability to host content locally and use IXPs for quick access to content.

Access infrastructure

Policies to promote access infrastructure must address the entire network, from international connectivity to the last mile connection that enables users to go online.

International connectivity includes both submarine cable for coastal countries and cross-border terrestrial cable for land-locked countries. It is critical to connect the domestic networks with international users and content. As up to 90% of traffic in emerging markets is international, the cost of international connectivity can be critical to retail prices.⁵

There have been significant increases in both the number of submarine cables in recent years, as well as an increase in the number of providers with access to the cables, owing to open access policies adopted by a number of cable owners. However, cross-border terrestrial connectivity has lagged in some regions, owing both to complications in crossing borders and challenges in deploying cable over difficult terrain.⁶ Regional connectivity can help people to access content and services without unnecessarily relying on overseas connections.

Domestic connectivity is needed to bring traffic from international gateways to ISPs' points of presence, to connect cities to each other, to reach IXPs, and to connect to mobile towers to send and receive traffic. The rollout of terrestrial fiber infrastructure, especially for long haul and middle mile connectivity, is important given the growth in the amount of data generated by information and communication technologies (ICTs) and increasing demand for high bandwidth services.

Last mile connections While fixed networks are heavily used where they are already deployed, the cost of deploying new ones is often prohibitive. Wireless networks are cheaper to deploy, support

Policy principles for expanding access infrastructure

Policymakers should:

- Promote investment in infrastructure and remove barriers to investment and competition
- Promote open access, and create transparent and affordable licensing processes and procedures at all levels of infrastructure
- Work collaboratively with neighbouring governments to harmonize and coordinate regional cross-border interconnection and licensing regimes
- Price rights of way access at cost, not to extract revenues, and ensure sharing of government networks for deploying fibre, including roads, railroads, and electricity
- Encourage dig-once policies, particularly when accessing government rights of way, and support infrastructure-sharing to ensure more coordinated infrastructure deployment, development and use
- Ensure adequate spectrum is available, managed so that secondary use is encouraged, priced fairly to encourage investment and competition, and with incentives for operators to use it efficiently
- Encourage and support community-based access initiatives, educational networks, and local research and development initiatives, to promote innovation in access models and encourage use
- Avoid burdensome taxes on end-user services and devices which stifle demand, keeping in mind that increased Internet access drives wider economic growth and thus government revenues
- Finally, as technology and business models evolve quickly, governments should ensure their policies are technology neutral, and that their frameworks and processes are flexible enough to encourage new ways of delivering access.

facilities-based competition between operators, work on standardized networks benefitting from economies of scale, and offer increasing amounts of capacity to support new high bandwidth services.

Local content and local traffic exchange

Locally relevant content should not just be available, it should be locally accessible.

Locally relevant content and useful services are essential to bring people online and increase usage. Many people who choose not to be online cite lack of interest, but the cost and reliability of accessing local content also has an impact. If a page fails half way through loading or just takes too long, people get frustrated and avoid the content. Services such as Voice over IP or video-streaming are especially vulnerable to delays.

Locally relevant content includes news, public and commercial services, and entertainment which meets local interest. It can be generated internationally or locally, and is available in local language(s). It is critical to getting and keeping people online.⁷ Locally relevant content needs to be suitable for local usage patterns, including the devices used to access the Internet, the degree of shared access, and local payment constraints and mechanisms.

Locally hosted content is locally relevant content that is hosted in-country, either on servers, in caches or by a content delivery network (CDN) presence in the country. It tends to be cheaper to access, especially for ISPs, because it does not use international bandwidth. For users, it tends to load faster and more smoothly. Unless there are reliable and affordable data centers and hosting providers, with well-trained staff offering up-to-date security practices, businesses will host their content outside the country or the region, affecting the cost, speed and quality of user access.

As a study in Rwanda shows (see box), local content is often hosted abroad because of the lack of local hosting options or to save money. But the result is that it loads slowly and costs more to provide, stifling usage.⁸ Content infrastructure, including data centers and hosting capacity, is needed to make local content hosting a viable option for content developers. Hosting content and services locally increases their use by individuals.⁹ It encourages people to access more, which in turn can support a local market ecosystem of high-quality online services and jobs.

Promoting the local accessibility of content – a case study of Rwanda

Our study *Promoting Local Content Hosting to Develop the Internet Ecosystem*, which focused on Rwanda as a case study, showed the importance of encouraging the local accessibility of content.

For many countries, including Rwanda, the majority of content accessed by local users is hosted abroad, such as in Europe or the US. This is often due to the lack of cost effective and reliable local hosting options. To get to a local user, however, the content has to travel long distances over expensive international routes.

While content providers find it cheaper and sometimes more reliable to host their content abroad, it makes access more expensive for local Internet Service Providers (ISPs) and their customers. It also takes longer for users to download, which lessens user content consumption and demand.

For example, one Rwandan web developer reported that they saved over USD \$100 per year by hosting overseas. However, this resulted in a cost of over USD \$10,000 for ISPs to deliver the content back to users in Rwanda. It also took over 30 times longer for users to download compared to locally accessible content.

The launch of content caches in Rwanda, however, demonstrated how locally accessible content can increase demand. For example, Akamai, a commercial content delivery network, began providing content in Rwanda through a local cache. Data showed that demand doubled within three months because it loaded faster. And a Google Global Cache placed in Rwanda helped increase local traffic exchange by fourfold. Furthermore, this content was delivered over less expensive local connections.

With these insights in hand, and the support and encouragement of the Rwandan Government, stakeholders in Rwanda are working together to further increase the amount of locally accessible content and expand Rwandan content-hosting sector.

Promoting Local Content Hosting to Develop the Internet Ecosystem, 2015
<http://www.internetsociety.org/doc/promoting-local-content-hosting-develop-internet-ecosystem>

What are the basics of content infrastructure and how can policymakers support it?

Data centers A data center can play many roles, including acting as a point of presence for one or more ISPs and providing physical space where content hosting, cloud services, IXPs and other data services can be located. The key requirements are fiber capacity to connect to the broader Internet, racks to hold servers and routers, electricity and air conditioning to power and protect the equipment, adequate physical and virtual security to keep it robust and redundant, and staff to keep the data center continuously operational and assist remote customers.

Data centers are often owned and operated by a provider such as a telecoms operator. Independent, “carrier neutral”, data centers are increasingly popular. They let customers connect with the carriers or providers of their choice. While data centers may host content themselves, typically they provide space for third-party providers to host their own content.

Hosting infrastructure International content providers often use the services of a content delivery network (CDN) to help deliver content to local servers where they are more easily accessible by users. Some large content providers, such as Google, place their own caches to host content like YouTube videos. Local hosting providers help smaller regional or local content providers make their websites available and can also provide email and other value-added services.

Internet exchange points The IXP plays a critical role for both access and content provision. It lets ISPs exchange traffic with each other and content providers locally, without using international connectivity. This lowers the cost of traffic exchange, as expensive international connections – paid in foreign, hard currency - are not needed. Lower traffic costs facilitate in particular high bandwidth services such as video streaming, while local traffic exchange lowers latency, enabling time-sensitive services such as voice or video calling.

Policy principles to support local content and traffic exchange

Policymakers should:

- Connect their e-government services to local IXPs to provide an incentive for ISPs to connect, and provide more reliable access to government services for citizens
- Ensure legal and policy clarity for local content developers, hosting providers, CDNs, and data centres. This can include intermediary liability protection to increase the willingness to host third-party content. Policies should not unduly restrict the ability of carrier-neutral data centres to host content
- Design online services to serve citizens while also driving use, increasing skills and employment for local programmers, and content hosted at local data centres
- Consider and mitigate where appropriate the cost to local ISPs, IXPs, hosting providers and data centres of electricity and equipment. Electricity is a critical input for a data centre, where high cost or poor reliability can significantly increase the cost and risk of hosting content locally in comparison with international alternatives. Governments should also consider the impact of high duties and taxes on equipment imports, and long and unpredictable customs checks. These significantly raise the cost of hosting and access infrastructure and make these organizations less resilient and responsive
- Avoid mandating a requirement for local hosting of content or data. Instead, promote an environment that makes local hosting a viable option for content producers and distributors
- Ensure they do not place constraints through licensing or regulation on operators’ ability to connect and peer at an IXP
- Remove barriers to entry for IXP operation and peering, and promote bottom-up community development and support for IXPs.

2. Fostering Skills and Entrepreneurship

Ensuring the development of skilled, trained, and engaged people who can create, sustain, and maintain infrastructure and online content and services is critical to development of the Internet.

To promote a strong local ecosystem of infrastructure, content and services, human capacity-building is essential. The benefits of investing in human capacity are clear; high quality, sustainable jobs that bring wider prosperity and stability, and the chance to be creators and not just consumers in the global digital economy. For access and content infrastructure, the following are needed:

- Network operators and carriers with advanced technical training and skills to deploy and operate networks
- IXPs need trained technical experts who understand network architecture, routing, networking and interconnection to ensure efficient and effective traffic exchange. All providers using an IXP should have training to understand both technical and economic aspects of interconnection and traffic exchange
- Data center staff who can meet and anticipate market demands in competition with low-cost, state of the art international data centers, and provide 24/7 professional services
- Hosting providers need to provide up-to-date services, including email, that prevent or mitigate both incoming spam and outgoing spam
- Community networks need training to operate and use the network, and future trainers to promote local sustainable network management and operations and local community development.¹⁰

Regional and local network operator groups (NOGs), Regional Internet Registries, the Internet Society, and other bodies provide free or very low-cost training in countries or regions, in place of or supplementing more formal training programs. These organisations and their events can also promote broader community discussions about developing the ecosystem and promoting local or regional interconnection and traffic exchange.

Policy principles for fostering skills and entrepreneurship

Policymakers should:

- Support capacity-building by introducing appropriate classes on IT engineering and programming throughout the educational system, through to university level, as well as access to appropriate training outside the formal educational system, including online vocational and on-the-job training, using e-learning where appropriate
- Facilitate local innovation and entrepreneurship, including through innovation hubs. Policies that support access to finance, fair taxation, and balanced intellectual property protection will help create an environment where innovation can flourish.
- Ensure that local data centres, hosting providers, and content developers are considered (or even favoured) in procurement processes so they can build local experience, skills, and scale
- Encourage all access and content providers in their country, including incumbent operators, to participate in community-driven peering, interconnection, and IXP discussions. Government network and IT staff need advanced training, and should also be encouraged to take part in these technical community training activities and initiatives
- Promote general Internet skills training for both current Internet users and those yet to go online. This could be through the formal education system, public places such as libraries, community group programmes, or even Internet cafes. Such efforts can also increase the urgency of promoting general literacy as a fundamental building block of the digital economy.

Local entrepreneurs are important to develop local content and services, while also enabling income and jobs growth.

Local entrepreneurs are key to developing content and services that meet local demand, generate profit and create jobs. They need:¹¹

- Online access to relevant education, training, research, mentorship programs, open source software and designs, crowd-funding platforms and collaboration tools
- Innovation hubs such as iHub in Kenya where they can meet, go online, and develop networks to further their ideas and companies
- Online access to markets where they can sell their services (digital as well as traditional), both at home and internationally, including domestic and international payment mechanisms to monetize their services through sales, subscriptions, and advertisements
- Help to promote a vibrant ecosystem, including balanced intellectual property protection, fair taxation, and access to finance, so that successful entrepreneurs and a newly skilled workforce will stay and not depart for established high-tech clusters such as Silicon Valley.

Finally, people need digital literacy, and trust in the privacy and security of the Internet, to develop the ability and confidence to use the whole range of available online content and services.¹²

3. Supportive Governance

As the Internet is an enabler for content and services across all government ministries, business sectors, and civil society, overall policy should be multi-dimensional and inclusive. A narrow sectoral approach will not succeed in connecting the world's unconnected 57%. Policy developed largely or solely through a single ministry or communications regulator may focus too narrowly on access infrastructure and not enough on developing and promoting content and services. Policymakers should also take advantage of the expertise and commitment of the range of stakeholders involved in the Internet.

As well as the specific policies on infrastructure and human capacity described above, additional principles and practices will support an enabling environment for Internet investment and use:

- High level political leadership to develop a clear and well-communicated strategy and plan, and to implement it with oversight over *all* relevant parts of government, breaking down silos and coordinating actions
- Actively promoting a multi-stakeholder approach to policy-making, which ensures that all stakeholders have a voice, processes are open and accountable and that problems are addressed with community input and support¹³
- An independent telecommunications regulator operating under a defined policy to provide regulatory certainty that encourages private sector investment, using a light touch where possible to promote innovation and competition in Internet access.
- Transparent and publicly available government policy that promotes both the supply and demand side through domestic procurement of infrastructure and services, as appropriate.

Other important Internet-enabling policies and government activities include:

- Communications regulation reform that embraces a multistakeholder approach, particularly in fast-moving environments where traditional top-down regulation or policies may not anticipate changes or react quickly, for example, on emerging issues such as net neutrality or zero-rating¹⁴
- Promoting a collaborative security approach to increase broad trust in the Internet, along with data protection laws to ensure privacy for sensitive data that underpin new financial, health, and other services using personal data¹⁵
- Government support for critical infrastructure improvements, including the adoption of IPv6, the use of DNSSEC, and other technologies to improve the use and security of the Internet.¹⁶

Multistakeholder Internet governance attributes

The global Internet community – people in almost every country from the technical community, business, civil society and government – has over forty years of experience in creating, improving, deploying and coordinating the Internet. It is a valuable resource for future policy and decision-making to maximise and extend the Internet's benefits.

The fundamentals of Multistakeholder Internet Governance can be applied to existing processes across a range of policy areas to make decision-making more collaborative and effective, and produce workable outcomes that all stakeholders will implement. The fundamental attributes are:

- Inclusiveness and transparency;
- Collective responsibility;
- Effective decision-making and implementation;
- Collaboration through distributed and interoperable governance.

In the Internet area, and in other areas, the multistakeholder approach is seen as the optimal way to make policy decisions for a globally distributed network.

Multistakeholder decision-making is accountable, sustainable and effective. The better the inputs and the more inclusive the process, the better the outputs and the more successful their implementation.

Internet Governance - Why the Multistakeholder Approach Works,
<http://www.internetsociety.org/doc/internet-governance-why-multistakeholder-approach-works>

Policies and approaches that promote the enabling environment more broadly include:

- Sustained government efforts to improve the ease and predictability of doing business, including ensuring transparent, open, fair, and timely government processes and decision-making. This is essential to creating a favorable investment climate that will fuel Internet growth and is key to increasing entrepreneurship that fosters new services and content.
- Ensuring a domestic payment system that allows “unbanked” populations to use online banking, for example, mobile money, and that allows people to buy and sell online content and services. This should be internationally integrated so that users and providers can buy and sell content and services abroad, including physical goods, services, and mobile apps¹⁷
- Government tax policies and import duties that do not unduly depress demand or raise the time and cost of providing infrastructure and content, while at the same time fairly recovering taxes from companies providing services in the country, whether domestic or international.

Conclusion

The Internet Society sees a profound urgency in achieving our vision that the Internet is for everyone, everywhere. It is increasingly recognized, most notably in the recent adoption of the UN Sustainable Development Goals (SDGs), that access to ICTs helps enable and accelerate development in key areas including healthcare, education, gender equality, and financial inclusion. Yet in spite of widespread availability and increasing affordability, Internet growth rates are slowing down worldwide, and adoption is still well below half of the global population.

To connect the remaining 57% globally and make universal and affordable access and use a reality, all stakeholders need to widen their focus and renew their efforts. Internet availability is necessary but not sufficient. The Internet will only be fully adopted, and its benefits universally shared, when there is compelling local content, made available locally. Further, there is a clear need to develop human capacity and open up governance structures around the Internet to a multi-stakeholder approach.

In order to improve access and content availability, this policy framework focuses on increasing Internet infrastructure investments, both in access networks and content infrastructure; helping to realize human capacity both to run networks and also develop content and services; and improving governance principles and rules that will promote widespread availability and online usage. This practical policy guidance can be flexibly applied in each country and region's unique situation to help realize the global potential of the Internet.

Endnotes

1 See the United Nations Sustainable Development Goals, including goal 9.c which aims to “Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020” <https://sustainabledevelopment.un.org/sdg9>

2 For a map of Internet penetration rates around the world, see the Internet Society’s Global Internet Maps at <https://www.internetsociety.org/map/global-internet-report/>

3 See “Explaining the Digital Divide in Brazil” by Michael Kende at <https://www.internetsociety.org/blog/latin-america-caribbean-bureau/2015/09/explaining-digital-divide-brazil>

4 See for instance “Lifting Barriers to Internet Development in Africa” by Robert Schumann and Michael Kende at <http://www.internetsociety.org/doc/lifting-barriers-internet-development-africa-suggestions-improving-connectivity> and Internet Society Policy Briefs at <http://www.internetsociety.org/policybriefs>

5 This can be true even in countries with Internet Exchange Points, which curb local traffic from routing internationally. In countries without locally hosted content, local traffic is generally more text oriented (e.g. emails and messages) and represents a relatively low percentage of total Internet traffic generated and consumed.

6 This was noticeable in a recent assessment that the Internet Society did in the Kyrgyz Republic, a landlocked country with limited terrestrial connections to neighbours to reach submarine cable landing stations. See “Kyrgyz Internet Environment Assessment” at <https://www.internetsociety.org/publications/kyrgyz-internet-environment-assessment>

7 2011 UNESCO/OECD/Internet Society study “The Relationship Between Local Content, Internet Development, and Access Prices”, www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CI/CI/.../local_content_study.pdf

8 See “Promoting Local Content Hosting to Develop the Internet Ecosystem” by Michael Kende and Karen Rose at <https://www.internetsociety.org/news/local-internet-hosting-opportunities-key-furthering-internet-development-emerging-economies>

9 “Promoting Local Content Hosting to Develop the Internet Ecosystem” by Michael Kende and Karen Rose at <https://www.internetsociety.org/news/local-internet-hosting-opportunities-key-furthering-internet-development-emerging-economies>

10 The Wireless for Communities project, a joint initiative of the Digital Empowerment Fund and the Internet Society, provides examples for how to foster and sustain community networks. See <http://wforc.in/>

11 For more information, see “ICTs for Inclusive Growth: E-Entrepreneurship on the Open Internet”, by Michael Kende for the World Economic Forum Global Information Technology Report 2015 at <http://reports.weforum.org/global-information-technology-report-2015/1-4-icts-for-inclusive-growth-e-entrepreneurship-on-the-open-internet/>

12 For more information, see the Internet Society document, “A policy framework for an open and trusted Internet” <http://www.internetsociety.org/doc/policy-framework-open-and-trusted-internet>

13 See <http://www.internetsociety.org/doc/internet-governance-why-multistakeholder-approach-works> for more details.

14 For more information, see Internet Society Policy Briefs on these and other topics located at <http://www.internetsociety.org/policybriefs>

15 An overview document on the collaborative security approach is located at <http://www.internetsociety.org/collaborativesecurity>

16 For information on DNSSEC and IPv6 deployment, visit the Internet Society Deploy360 programme page at <http://www.internetsociety.org/deploy360/>

17 See “The Mobile App Divide” by Michael Kende at <http://www.internetsociety.org/doc/discussion-paper-mobile-app-divide>

