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VIA EMAIL: *WTSA2020@ntia.gov*

Office of International Affairs
National Telecommunications and Information Administration
U.S. Department of Commerce
1401 Constitution Avenue NW
Room 4701
Washington, DC 20230

*Re: Input on Proposals and Positions for the 2020 World Telecommunication Standardization Assembly*

Thank you for the opportunity to provide recommendations on priorities for the U.S. delegation and the NTIA at the 2020 World Telecommunication Standardization Assembly (WTSA-2020) of the International Telecommunication Union (ITU).

Both the Center for Democracy & Technology and Mozilla are deeply invested in creating a healthy global internet, and the NTIA has a deep knowledge and critical role in protecting the internet on the global stage. We are glad that the NTIA is exploring these important questions around international standards for the internet. We also appreciate the role of the U.S. delegation in ensuring that the internet remains a vibrant and global tool, based on interoperable and open standards.

The Center for Democracy & Technology (CDT) is a non-partisan, non-profit U.S.-based civil society organization that works globally to defend human rights and civil liberties online. For 25 years CDT has played a leading role in shaping the policies, practices, and norms that have empowered individuals to more effectively use the internet as speakers, entrepreneurs, and active citizens. CDT brings legal and technical expertise, thought leadership, and coalition-building skills to its work with domestic and global policy institutions, regulators, standards bodies, governance organizations, and courts.

Mozilla is a global community of technologists, thinkers, and builders working together to keep the global internet open, accessible, and secure. Mozilla is the creator of Firefox, an open source browser that hundreds of millions of people around the world use as their window to the web, as well as other products including Pocket, Focus, and Firefox Lite. To fulfill the mission of keeping the web open and accessible to all, Mozilla is constantly investing in the standards work that enables a globally interoperable internet. Additionally, Mozilla engages in policy and advocacy work to advance key characteristics of the internet, from privacy to internet access to innovation.

CDT and Mozilla are filing these recommendations and comments in order to suggest that the NTIA, and the U.S. delegation generally, should use the 2020 World Telecommunication

Standardization Assembly (WTSA-2020) of the ITU to advocate for open and interoperable standards in the public interest in ways that are inclusive and transparent. We also believe that the U.S. delegation should argue against the need for a new, top-down standards architecture for the internet, often termed “New IP.”

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# Future Networks and the “New IP”

The rapid growth of services on the internet has been accompanied by a slower but equally important evolution of its underlying protocols and standards. Over the past three decades, standards such as Hypertext Transfer Protocol (HTTP), Transport Layer Security (TLS) and Domain Name System (DNS) have been improved by standard setting bodies like the Internet Engineering Task Force (IETF) to create a safer and more efficient internet for billions of users around the world.

Over the past three years, Huawei and other organisations have suggested at the ITU that this pace of evolution is insufficient for the future of the internet,[1] and suggested a substantial expansion of the role of the ITU Telecommunication Standardization Sector (ITU-T)[2] in standards development towards New IP.[3] The ITU-T has tasked a new Focus

[1] China and Huawei propose reinvention of the internet, Financial Times. Available at: https://www.ft.com/content/c78be2cf-a1a1-40b1-8ab7-904d7095e0f2
[2] ITU Telecommunication Standardization Sector, Available at: https://www.itu.int/en/ITU-T/Pages/default.aspx
[3] Report of the fourth TSAG meeting (Geneva, 23-27 September 2019). Available at: https://www.itu.int/md/T17-TSAG-R-0008/en

Group (FG NET 2030) of Study Group 13 (SG13)[4] to examine "Technologies for Network 2030"[5] and "capabilities of networks for the year 2030 and beyond."[6] This group is currently the focal point of the vast majority of discussion around an idea that has come to be called New IP.

Arguments for New IP are centered around quality of service, security, and topology-related limitations of the Transport Control Protocol/Internet Protocol (TCP/IP) stack that is the bedrock of the internet. Proponents have also proposed a variety of ideas for alternative technical standards that are allegedly better suited for new technologies (such as 5G, augmented reality, satellite communications, etc) under the umbrella title of New IP.

However, the New IP proposal attempts to disrupt the egalitarian, multistakeholder, and resilient model of maintaining core internet technologies in diverse Standards Developing Organizations (SDOs). New IP focuses on a multilateral approach that is far more rigid and fundamentally incompatible with the open nature of the internet, replacing it instead with a new "top-down" internet architecture.[7]

Future networks, specifically New IP, proposals must be carefully considered on two primary fronts:

1. Whether entirely new replacements are necessary for the tried and tested foundations of the current internet;
2. What major implications these new standards will have on civil, political and economic characteristics of the internet.

We will address these concerns in turn, showing that there is not evidence to justify the creation of a new internet from the ground up. Furthermore, the New IP approach is likely to create more challenges than it solves for governments, consumers, and service providers alike while also fragmenting a global public resource into incompatible silos. Improvements necessary to existing standards should be undertaken in multi-stakeholder standards bodies such as the IETF, and these improvements can be more than sufficient to meet the needs of the near future.

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[4] SG13: Future networks, with focus on IMT-2020, cloud computing and trusted network infrastructures. Available at: https://www.itu.int/en/ITU-T/studygroups/2017-2020/13/Pages/default.aspx

[5] Focus Group on Technologies for Network 2030. Available at: https://www.itu.int/en/ITU-T/focusgroups/net2030/Pages/default.aspx

[6] Network 2030 - A Blueprint of Technology, Applications and Market Drivers Towards the Year 2030 and Beyond (May 2019). Available at: https://www.itu.int/en/ITU-T/focusgroups/net2030/Documents/White_Paper.pdf

[7] Telecommunication Sector Advisory Group (TSAG) contribution T17-TSAG-C83 [C83], presented at the September 2019 TSAG meeting. The clearest visibility of the New IP proposal to reshape the internet is in a technical whitepaper (Representative use cases and key network requirements for Network 2030, FG-NET2030-Sub-G1 (January 2020), available at: https://www.itu.int/dms_pub/itu-t/opb/fg/T-FG-NET2030-2020-SUB.G1-PDF-E.pdf), and a presentation (New IP: Shaping the Future Network, ITU-T TSAG, Sep. 2019, available at: https://www.ttc.or.jp/application/files/7815/6989/4858/20191001.pdf).

# Do We Need New IP?

The justifications for New IP are mitigated by existing features of current technology, in particular the role played by the application layer, showing that New IP is not a necessary innovation.

According to its proponents, the main needs for a New IP network are identified as:

1. **Historical Legacy:** The proposal claims that the current IP framework is designed for computers and telephones, and is ill suited for future devices (such as IoT devices for industrial manufacturing).
2. **Interoperability and Isolation:** The proposal claims that the legacy limitation leads to the proliferation of new standards that do not speak to each other, leading to "islands" of networks.
3. **Trust:** The proposal claims that there are not reliable ways to balance anonymity and privacy.

The latest innovations in improvements to the traditional IP stack already sufficiently handle these concerns. For example, regarding the trust related concerns, these factors ignore the role played by TLS 1.3 in securing interactions between machines and improving trust. Both the legacy and interoperability points presuppose that creating a monolithic framework will be better than having a diverse set of standards for specific use cases which can co-exist along with the traditional IP stack (e.g. Bluetooth).

While it comes with many advantages - such as ubiquitous acceptance, ingrained interoperability and resilient scalability - modern technology has also shown that the TCP/IP stack has some disadvantages to the diversity of tasks that are required in modern communications:

- It is not generic enough to distinguish between protocols, interfaces and services, making the new stack ill-suited for technologies such as Bluetooth.[8]
- It is better suited for wide networks and not sufficiently optimised for local area networks due to unnecessary redundancies that increase processing overhead.[9]

Despite these drawbacks, rather than replacing the TCP/IP stack, standards developing organisations (SDOs) such as the IETF and the ITU have created additional standards to fulfil market needs. These include both standards that run on top of, coexist or operate alongside the TCP/IP stack such as Real-time Communications for the Web (WebRTC) (which powers many online video and voice calling services), and those that exist outside of the TCP/IP stack such as Bluetooth. TCP/IP is already flexible.

[8] What are the drawbacks of OSI model and why TCP implemented instead of OSI? Available at: https://specialties.bayt.com/en/specialties/q/279218/what-are-the-drawbacks-of-osi-model-and-why-tcp-implemented-instead-of-osi/

[9] 2 Problems with TCP/IP. Available at: https://www.usenix.org/legacy/publications/library/proceedings/ana97/full_papers/rodrigues/rodrigues_html/node2.html

This inherent flexibility of SDOs to create new standards that fulfill the needs of innovation while creating a reliable foundation of core standards (based on usage and acceptance) has let 40 year old frameworks such as TCP/IP effectively scale for billions of devices to thrive on the internet. The New IP approach, rather than organically gaining acceptance and usage like other standards, is explicitly attempting to replace this core foundation with a top-down, centralised and monolithic stack for the internet. And it does so under the auspices of another SDO, the WTSA, thus foregoing the inherent benefits of continuity and a consensus driven approach at the IETF that has evolved the internet in the inclusive, interoperable and adoption driven manner over the past 30 years.

## What are New IP's Potential Impacts?

The most clearly delineated impacts are the following, all of which will affect businesses, current internet functionality, and internet users:

1. **Interconnecting Many Nets (Heterogeneous Networks):** To overcome current silos between "islands," New IP suggests a new, heterogeneous address space (many nets) which uses flexible length addresses that subsume usual network IDs such as IP and MAC addresses. It suggests that this will allow such devices to communicate with each other directly, ignoring that such islands are an outcome of design decisions motivated by feature requirements (i.e. Bluetooth devices are designed to be able to talk to each other independent of the internet) and other non-technical business or policy factors. In contrast to the assumptions underlying this proposal, the traditional IP stack has proven itself to be resilient and can run on top of many technologies, as illustrated in the table on page 7. Further, IPv6 is designed to have universal addressing, and it is not clear why one would want to have addressing that is somehow tied to the lower layers.
2. **Deterministic Forwarding:** Tackling the issue of latency and reliability, the proposal suggests that the traditional IP model is ill suited for telemedicine, self-driving cars, and other time-sensitive use cases. It suggests a network layer deterministic approach that allows for a latency criteria to be set on demand, overriding the 'dumb pipe' nature of the traditional IP stack. This ignores the vast majority of work already taking place at 3GPP (an SDO group), IETF, and IEEE on the same issue, and does not account for the fact that, regardless of protocol, the speed of light limits communication to about 300km if one wants to be within 1ms of latency.
3. **Intrinsic Security:** To overcome issues of authenticity, integrity and availability, the model suggests dynamically auditable IDs for devices that are based on decentralised management frameworks that run on a distributed ledger. It is unclear how this would operate in practice, especially without adding to the 'islands' problem that unique technologies cannot talk to each other. Further, qualities of TCP/IP such as its permissionless nature, anonymity at the addressing level, etc. are actually seen as desirable traits rather than security concerns.
4. **Ultra-High Throughput:** To address issues of bandwidth constraints in the traditional IP stack for applications such as augmented reality or holographic entertainment, the proposal pushes Huawei's Big Packet Protocol (BPP) as a

solution, while ignoring existing work on improving standards such as BBR and L4S at the IETF which are likelier to be widely accepted. Any additional benefits that can in theory be provided by BPP can be implemented adjacent to the existing IP stack.

Crucially, the presentation recognises that there are inherent benefits of traditional IP that the New IP proposal should seek to include such as robustness, global reach, and best effort support. The apparent dire need for a New IP framework is placed in even more stark contrast to the reality, when seen in light of the significant work that is already underway on each of these four issues within the broader framework of traditional SDOs.

# How Should the U.S. Delegation Approach New IP?

## *Arguing Against New IP Proposals at the ITU-T*

The following are key arguments against New IP that the U.S. needs to establish, in partnership with other delegations, in its representation at at the ITU-T:

**Existing Work Streams in SDOs[10] Are Already Handling New IP's Goals**
For many problems and suggested solutions mentioned by the New IP framework, pre-existing work in various SDOs is either better suited to solve the problem or is more likely to be accepted due to buy-in from various stakeholders who are more invested in its success.

Most importantly, all of these work streams plan to co-exist with the traditional IP stack (since none of them plan to replace it). This showcases that the binary choice of traditional stack solutions versus New IP being projected by the New IP's purveyors simply isn't true. While it is true that some standards developed at SDOs such as IETF take a long time to gain pervasive market share (for example, IPv6), this is reflective of the considerate nature of effective standards development rather than a problem with SDOs generally. Further, the market realities that lead to the relatively slower adoption of internet standards will be equally, if not more, applicable to the outcomes generated by the ITU-T under the New IP workstream.

In order to illustrate the breadth of this redundancy, the table on the next page contains a non-exhaustive summary of all the work already taking place for each of the four features highlighted by the New IP focus group.

[10] Discussion Paper: An analysis of the "New IP" proposal to the ITU-T (April 2020). Available at: https://www.internetsociety.org/resources/doc/2020/discussion-paper-an-analysis-of-the-new-ip-proposal-to-the-itu-t/

*Existing Standards/Working Groups that overlap with New IP Solutions*

| **New IP Solutions** | **SDO** | **Existing Standards/Working Groups** |
|---|---|---|
| **Interconnecting Many Nets (Heterogeneous Networks)**<br><br>**Counter:** Traditional IP stack is already sufficiently flexible and can interconnect various technologies, since it is a transport neutral protocol | ITU-T | G.9959, X.25, Satellite, DOCSIS (Cable), Television Signals (VBI, MPEG2) |
| | IEEE | WPAN (802.15.4), Ethernet (802.3), Token Bus (802.4), Token Ring (802.5), Wi-Fi (802.11), 802.16 (WiMAX) |
| | 3GPP | GPRS, LTE, 5G |
| **Deterministic Forwarding**<br><br>**Counter:** Redundant, many SDOs are already solving for it in the traditional IP stack | ITU-T | SG15 |
| | IETF | IETF Deterministic Networking (detnet) and Reliable and Available Wireless (raw) |
| | 3GPP | Ultra-Reliable Low Latency Communications (URLLC) capability over the Radio Access Network (RAN) |
| | IEEE | IEEE 802.1 Time Sensitive Networking (TSN) |
| **Intrinsic Security**<br><br>**Counter:** The concerns that are used to create the need for intrinsic security (permissionless, anonymity) are in fact positive traits. Further, application layer solutions solve many problems and aid in wider deployment | ITU | X.509 (public key certificates) |
| | IETF | IPsec (for IPv6 - [RFC1883]) |
| | 3GPP | Security Edge Protection Proxy (SEPP) for 5G |

| | | |
|---|---|---|
| **Ultra-High Throughput**<br><br>**Counter:** Work already being covered under TCP for Data Centers,[11] BBR,[12] and L4S[13] at IETF, demand for such bandwidth still some time away | IETF | Real-Time Transport Protocol (RTP) [RFC3550], QUIC |

**New IP Has High Economic Impact of Deployment Without Reverse Compatibility**
The internet has largely been running on IPv4 for the past few decades, with IPv6 adoption steadily rising since 2010 but still far from ubiquitous. A move to a New IP framework will create astronomical costs of investing in new hardware for the entirety of the internet (which could easily run into trillions of dollars). It will also further the creation of 'islands' of technology due to the need to maintain reverse compatibility with traditional TCP/IP stack. Directing focus on work that is already taking place at SDOs will let the internet enjoy New IP's ostensibly unique advantages while mitigating many of its drawbacks.

**Top-down Standards Development Lacks a Feedback Loop**
Internet standards are fundamental building blocks that can loosely be interconnected to provide required services, with market uptake determining which will be successful (taking into account ease of deployment and costs). This process also allows for bugs to be detected, new features to be built and security to be improved based on real world circumstances and use cases. Jump-starting a top-down approach to creating an all-inclusive architecture will make optimization harder to implement, reduce security, and lead to feature creep.

## *Recommendations for Next Steps*

The U.S. delegation should participate in the activities of SG13 of the ITU-T, Focus Group on "Technologies for Network 2030" and the Telecommunication Standardization Advisory Group (TSAG) to ensure discussions regarding the problems New IP is attempting to solve reflect global concerns and are decided by diverse representation. This concentrated engagement should extend to other organisations involved in the development of internet and technology standards such as the IETF, IEEE, ISO, etc. Furthermore within the WTSA and specifically within SG13, the U.S. should:

1. Oppose the creation of a new resolution on "New IP", future networks, or Network 2030.

[11] RFC 8257 - Data Center TCP (DCTCP): TCP Congestion Control for Data Centers (October 2017). Available at: https://tools.ietf.org/html/rfc8257
[12] BBR: Congestion-Based Congestion Control (December 2016). Available at: https://queue.acm.org/detail.cfm?id=3022184
[13] Low Latency Low Loss Scalable throughput (l4s). Available at: https://datatracker.ietf.org/wg/l4s/charter/

2. Oppose any direct references to FG NET 2030 in Resolution 2 on study group responsibility and mandates. Res. 2 should also not connect FG NET 2030 outputs to the development of Recommendations at the SG level.
3. Reinforce the IETF as the appropriate forum for considering standards development related to IP or new IP by proposing a modification to A Suppl. 3 on IETF and ITU-T collaboration guidelines.

After the WTSA, NTIA should work with the Department of State to set aside more resources for engagement in the Focus Group for the next study period. During this time, the U.S. should:

1. **Evaluate:** The vast majority of the apparent need for New IP is based on presumptions that are either technically incorrect (e.g. the contention that traditional TCP/IP is the primary reason for lack of interoperability) or show lack of awareness of work done by SDOs in tackling similar issues. The U.S. delegation should ensure that discussions of New IP accurately reflect the technical underpinnings and implementation of the modern internet.
2. **Redirect:** The U.S. delegation should ensure that any effort to push New IP further does not duplicate efforts, waste resources, or undermine active draft standards. Depending on the New IP feature, efforts should be redirected towards the SDOs mentioned in the table on page 7 so as to not reinvent the wheel.
3. **Utilize:** The U.S. delegation should ensure that work done by the Focus Group on "Technologies for Network 2030" can be useful to evaluate upcoming demands that will be placed on technology in general and better inform the ongoing work at SDOs to solve related problems, such as within the IETF and IRTF which could use them to improve existing standards and holistically research the need for creating new ones in a reliable environment.

# Stakeholder Representation in the U.S. ITU Delegation

The ITU's voting membership consists only of states, and has very little to no direct participation from sector members representing stakeholder groups that are not industry. This hampers its effectiveness in identifying current telecommunications issues, its understanding of the mechanics of technologies, and its ability to propose solutions that respect online civil liberties. Additionally, the ITU's structure incentivizes members to prioritize national interests over workable and fair policies, alienating civil society stakeholders and private companies alike. Combined with the ITU's efforts to expand its mandate to work on internet-related issues and internet architecture, work items and resolutions from the ITU-T both tend to be unrealistic and encroach on the work of other SDOs.

The U.S. delegation must be able to quickly identify problematic policies that are technically infeasible, hamper civil liberties online, and bloat the ITU's mandate into overlapping with more effective and intrinsic multistakeholder bodies like the IETF. A meaningful

multistakeholder approach within the U.S. delegation will facilitate conversation on why top-down proposals like New IP are harmful to existing systems. We recommend three key changes to the U.S.'s ITU delegation:

1. **Include U.S. SMEs representatives:** Major changes to the structure of telecommunications systems are most likely to impact telecommunications giants, many of whom are U.S.-based. However the telecommunications industry is not monolith and many of these changes will impact small operators and community networks, perhaps even disparately to multinationals. These companies not only have the most to lose, but are also in the best position to explain technical nuances inherent in last-mile connectivity and provide insight into how innovation and future private-sector technical development will be impacted.
2. **Include members of civil society and academia:** Civil society is best positioned to evaluate how new telecommunications proposals will impact civil liberties and human rights online. Nation states curtailing privacy and increasing government power over telecommunications systems represents a very strong threat to the decentralized, democratic, and liberal nature of the internet. Structural changes to these systems will impact privacy, media bias, and freedom of expression, and civil society and academia are well positioned to assess such impacts and help formulate narrow policies that support the traditional principles of the internet. Only as part of a state delegation will these voices be meaningfully heard at the WTSA and ITU.
3. **Seek input from the investment community, other government standard setting bodies, and consumer groups:** The investment community has an indirect impact on telecommunications systems, but is well-positioned to understand which technologies are likely to grow in the future. Additionally, coordinating with other government agencies that regulate telecommunications and privacy like the FCC, FTC, and HHS is likely to result in a disciplined approach to ITU engagement. Additional consideration of existing agreements like the Tallinn Agreement and Budapest Convention is also likely to streamline the U.S. Delegation's approach into a more coherent one at the ITU.

Expanding the delegation increases expertise, capacity, and access. Furthermore the ITU can incorporate civil liberties and privacy concerns without having to change their mandate or agenda. Allowing these groups to play a role will also create a different baseline that moves the negotiating window towards U.S. interests in a free and fair internet.

# Access to ITU-T Working Documents and Groups

The ITU's restriction of access to working documents limits participation by non-government organizations. The closed-door nature of working groups and the decision making process make proposals and outcomes weaker, and reduces the possibility of ITU policies being seriously considered among internet and telecommunications stakeholders like users, companies, and civil society groups. Additionally, the lack of transparency prevents SDOs, telecommunications stakeholders, and civil society groups from providing input and preventing the ITU from proposing solutions that fall outside its mandate or that encroach on

the roles of other SDOs, such as the IETF, which are de facto players. Increasing transparency through the following means will prevent scope creep, ensure that pertinent issues like privacy and financial feasibility are addressed, and combat politicization of technical issues:

1. **Access to resolutions and working documents:** By providing access to works in progress in focus groups and study groups, non-state stakeholders can provide legitimate input that will make work items more credible, narrower in scope, and technically feasible. Additionally, the larger technical community in other SDOs would be able to provide engineering focused expertise on standards that have been critically tested.
2. **Showing leadership in government transparency by making proposals public**: While also arguing for easing the ITU's restriction on document access, the NTIA should elect to publish publicly its proposals to the WTSA. This level of transparency will facilitate broader stakeholder engagement and facilitate accountability. Furthermore, the U.S. should consider promoting this best practice to the Inter-Americas regional ITU member, CITEL.

# U.S. Government Involvement in Global Internet Standards

The ITU-T's role in standard-setting work has only recently begun to grow, thus expanding its mandate. To mitigate the ITU's unprecedented role in standard-setting work, the U.S. government must be more involved in supporting the leadership of, and providing input to, other standard setting organizations like the IETF, and implementing the standards set by such organizations. The U.S. government must put its weight behind multistakeholder organizations as the de facto approach to standard setting on the internet. Further, the government must use its leverage in such organizations to reinforce and strengthen meaningful multistakeholder participation and the ITU's tendency toward multilateral approaches.

1. **Norm-setting at multi-stakeholder organizations:** The U.S. government must do more to implement the norms defined by multi-stakeholder organizations, thus legitimizing the standards set by these organizations, and leaving smaller openings for the ITU to play a role. Additionally, the government must have cross-department communication to consistently and evenly implement these standards, leaving little room for error or erroneous interpretation.
2. **Strengthening multi-stakeholder organizations:** The U.S. government, and NTIA by extension, must judiciously use its privileged position on ICANN and IANA to prevent the alienation of prominent countries that play a constructive role in standard setting. A more cautious approach will allow multi-stakeholder organizations to be seen as more reliable and less biased, and thus increase the role of such organizations while weakening the ITU's scope creep into standard setting functions.

# Conclusion

Thank you for the opportunity to provide the NTIA, and the U.S. delegation, with our comments and recommendations. For more information, please feel free to reach out to either CDT or Mozilla.

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