

Interconnection and Numbering Issues at WCIT

By Paul Wilson, Director General, APNIC



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Paul Wilson joined APNIC in 1998 as the Director General. As part of this role, he represents the activities and interests of the Asia Pacific Internet Community in local and global forums related to the development and management of the Internet.

Prior to joining APNIC, Paul accumulated ten years technical and business experience in the Internet industry, including consultation on various Internet projects for the United Nations and other international agencies.

In 1989, Paul, as Technical Director, helped set up Pegasus Networks, the first independent ISP

established in Australia. From 1992 to 1997, he was the Chief Executive officer, and oversaw the successful growth of the company as a renowned service provider in Australia. During this time, he was involved with the establishment of the Association for Progressive Communications (APC), and served for several years as an APC Council and Executive Board member.

During the 1990's, Paul also consulted on various Internet projects for the United Nations and other international agencies, including the International Development Research Centre (IDRC). From 1994, he worked as a principle consultant on IDRC's Pan Asia Networking (PAN) Program, a program aimed at introducing and developing Internet services in developing economies of the region. In that capacity he worked on projects in many locations including Mongolia, Vietnam, Cambodia, Maldives, Nepal, Bhutan, PNG, and China; while also working on similar activities in several countries of Latin America.

The "WCIT" – the World Conference on International Telecommunications – is coming soon, to consider revisions to the International Telecommunications Regulations, the 1988 treaty which governs global telephony. These days telecommunications is much more than telephony of course, so a key question is whether the full range of modern telecommunications can possibly be covered by a new 2012 version of the ITRs.

Furthermore, since telecommunications in 2012 is almost exclusively linked with the Internet, the question is whether

- ▶ the ITRs can govern the Internet in the way that they have governed traditional telecommunications, or in any way at all. The WCIT may not explicitly include "Internet Governance" in its scope, but many of the WCIT proposals do have significant implications for the technical and commercial framework of today's Internet.

There are, for instance, WCIT proposals that would change how Internet interconnection works, and how business arrangements are made between interconnected networks. There are proposals designed to combat fraud in telephony, that could have unintended consequences if extended to encompass Internet operations. There are still more proposals which would see the ITRs encompass not only the Internet infrastructure, but also the full range of services and content that it carries.

It does seem sensible to ask whether the ITRs, modelled as a global treaty, can be elastic enough to effectively include the Internet without introducing limitations, ambiguities or contradictions, and whether such attempts risk adverse effects on today's most successful communications infrastructure.

I. Interconnection and Settlement

Two specific areas of difference between telephony networks and the Internet are those of "interconnection" between networks, and of "settlement" (or accounting) of the costs involved in those interconnections.

In the case of telephony, the established interconnection and settlement models adopted the paradigms of earlier postal and telegraph services, in which cooperating networks establish bilateral interconnections, and the caller (or sender) pays the entire cost of a given call or transaction. In the absence of any other model, the 1988 ITRs have the assumption of this model built into the very fabric of the treaty. International long-distance phone calls involve multiple carriers, but the caller still pays the price of establishing the end-to-end call. The ITRs prescribe an accounting mechanism where the "originating carrier" compensates the "terminating carrier" via an "inter-carrier settlement", which is a fee for the final "delivery" of the call. Based on the "call minute" as the settlement unit, these arrangements are negotiated on a bilateral basis between carriers, each being a member of a relatively small pool of State-owned monopolies.

By contrast, today's Internet service and business models have evolved quite differently, across numerous dimensions. The Internet model involves different types of participating provider organisations, of network interconnections, of network service transactions, and of user service charging; which together result in a fundamentally different approach to settlement and interconnection (to the extent that those terms even exist in the Internet environment).

On the Internet for instance, the sender does not "pay all the way" to get a packet from its source to its destination. Each

communications event consists of a variable number of packets and each IP packet could be thought of as being partially funded by both the sender and the receiver.

The user who generated the packet pays for an ISP service, that ISP may purchase transit services from another ISP and so on, for sequenced transit services across a cohesive framework of network interconnections and commercial relationships. At some point, the sender's money effectively "runs out" before it reaches its destination; however the packet is not left unfunded because at this point the receiver's services take over and the packet transits a path that is funded, effectively, by the receiver's ISP. To amend the ITRs by retrofitting "sending-party-network-pays" style settlement rates onto the Internet requires the existence of a service and delivery model that has no conceptual or technical equivalent on the Internet.

Internet traffic is routed on a neutral basis, without awareness of or dependency on the "application" which generates it. Individual Internet "sessions" are not and generally cannot be, identified or differentiated by the network itself, because routing decisions are entirely distributed. This approach is key to the cost-efficiency and technical efficacy of the Internet, and imposing a settlement regime which is inconsistent with it may be impossible without a global re-architecture, or a fragmentation of the Internet into low-cost, content-rich regions and high-cost, content-poor regions (a new form of digital divide).

II. Number Misuse

A well-known and legitimate concern, particularly in many Least Developed Countries (LDCs) and Small island Developing States (SIDS), is the "misuse" of E.164 numbers for various fraudulent purposes. WCIT proposals designed to combat specific types of fraud against the existing telephony settlements system may have equally significant effects on the Internet, in an overly generalised set of ITRs.

In one form of number misuse, rogue operators can effectively avoid international call settlement payments through the unauthorised use of telephone numbers drawn from their E.164 country code block, to the detriment of "terminating carriers" (and often their host nations) who lose the settlement revenues. The proposed remedy is to require governments to enforce conformance to the conventions of country code management and force carriers to direct outbound international calls only to other authorised carriers.

However, extension of these controls into IP addressing could create regulations mandating that IP packets must be routed along specific paths and may not be rerouted or terminated elsewhere. This may seem reasonable at first glance, but there are many legitimate and operationally necessary reasons to deliver packets elsewhere, or even to discard them altogether. Packet diversion and packet interception can be, in fact, standard Internet operating procedures, which in many

- cases increase network efficiency and security, and lower cost to users. Two such instances are described in the following.

Packet diversion

An Internet web “proxy” server works by intercepting web fetches and caching (copying and storing) the downloaded data; allowing subsequent requests for the same data to use the cached content rather downloading it again via an expensive transit path. These devices dramatically increase the performance and efficiency of IP networks by reducing unnecessary data transfers, but they do so by effectively redirecting traffic from its intended address. If such traffic manipulation were to fall under a broad definition of “number misuse,” the use of proxy services could be effectively outlawed.

Packet interception

Internet “firewalls” are security devices that intercept packets on a circuit and discard those that match a set of user-defined rules, in order to enhance security, restrict access, and deny certain types of requests. This type of deliberate interception and discarding of traffic is performed by almost every user, service provider, government and network operator of any description; and is an essential part of Internet stability and

safety. Once again it would be unfortunate if such techniques fell into a broad definition of “number misuse”.

III. Where to now

Profound technical and commercial changes have shifted the bulk of global communications from a “transactional” (telephony) model based in calls and minutes, to a “connection rental” (Internet) model in which all costs are bundled into a single service offering. This shift has been universal because it is both successful and commercially sustainable, but it is also one that is subject to ongoing evolution.

Introducing an intergovernmental, treaty-based, global regulatory scheme to codify or lock-in particular business models or technologies (even where regarded as “current”) could impose undue limitations on how networks are managed, and how they may be developed into the future. In considering revisions to the ITRs, we would do well to set our sights on a high-level set of principals and a regulatory framework that is neutral to technology and service -delivery models, and encouraging Internet growth by supporting a competitive, liberalised set of communications services that truly embraces the entire world.

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