Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	GN Docket No. 09-191
Preserving the Open Internet	)	
	)	
Broadband Industry Practices	)	WC Docket No. 07-52

COMMENTS OF
CORPORATION FOR NATIONAL RESEARCH INITIATIVES (CNRI)

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The FCC's Draft Proposed Rules for Public Input (Notice of Proposed Rulemaking, FCC 09-93, released on October 22, 2009 ("Notice")) appear based on a somewhat constrained view of what it means to be the Internet. Various issues raised in this context are quite significant and require more serious evaluation before being formally adopted. A few of the most basic issues are discussed below:

1.   Open Architecture: One troublesome aspect is the suggestion in the Notice that a regulatory distinction should be drawn between "broadband" access services provided in the "open" or "public" Internet, and managed or specialized services based on the Internet Protocol (IP), where such services may or may not be made available either publicly and/or privately in the Internet. Here, the wording in Section IV.G of the Notice (paragraphs 148 & 149) entitled "Managed or Specialized Services" needs careful review. As a global information system, the Internet is intrinsically a managed information environment. To establish artificial barriers between new and interesting managed or so-called specialized IP-based services and other resources so as to exclude such new services from the "open" Internet should not be reflected in FCC rules. Specifically, the word "open" or "public" in connection with the Internet should be deleted in order to remove the possibility of ambiguity in this context.

The stated purpose of the proposed rules, as set forth in § 8.1 (Notice, Appendix A, at 65) is to preserve the "open" Internet; however, at paragraph 62 of the Notice, there is a reference to the "historically open architecture of the Internet." Hopefully, the open architecture of the Internet is really what is being contemplated here. One possible interpretation of "open" Internet for purposes of "broadband access" would exclude information represented in digital form that is subject to access controls or otherwise deemed "managed" such as would be the case in connection with financial services, advanced health-care systems, or copyright management systems like the DOI System deployed by the International DOI Foundation (http://www.doi.org). This interpretation would serve as a potential barrier that could inhibit the growth of Internet services and applications; and it would be inconsistent with the notion of the Internet as it has evolved to date. Further, would the "cyber" security measures under consideration be classified as part of an "open" Internet or managed/specialized services? If such services are deemed "closed" or "managed" or "specialized" services, and not available to the "broadband" community, would this open vulnerabilities for users of "broadband access" services? In this context, while it is not central to this argument, consideration should also be given to deleting the word "cyber" when addressing Internet security issues since the use of "cyber" is an ambiguous term that adds little in the context of internet architecture considerations.

The apparent confusion between an open Internet and open-architecture Internet raised in the Notice may also reflect a basic misunderstanding of what it means to be the Internet. Based on substantial involvement with the Internet for decades, and discussion with many key participants in its evolution, CNRI contends that there is no "public" or "open" Internet vs. "private" or "closed" Internet, or IP-based services that are somehow not part of the Internet. In the Internet, various applications and other information resources and services are made available on various terms and conditions, including what may be

viewed as managed or specialized services, and various combinations thereof. Care should be taken not to erect regulatory barriers that might serve to impede the development and deployment of managed and/or specialized services in all parts of the internet, or to exclude them from what is deemed "broadband Internet access service" for FCC regulatory purposes. For example, where access to certain information at a U.S. government website is generally available to the public on an unrestricted basis, access control and other related services may be managed in order to guard against intrusion or to provide audit trails.

In essence, the Internet is a global information system that involves a set of standard and publicly available protocols, procedures, technology and software that may be deployed in a communications environment either publicly or privately, or some combination thereof, to disseminate, access or perform other operations on information resources represented in digital form, apart from the particular network, computer, device or other computational facilities used. An open architecture allows one to identify the elements of the architecture along with the ways in which such elements interact with each other, thus providing an open and transparent view of the system and key aspects of its functionality. This is generally what is meant when one refers to the "open architecture" of the Internet. Further, there would normally be direct and indirect interactions between the information infrastructure elements, and the information being made accessible in this environment by various information service providers, network operators, cable systems and other communications entities.

To make this a bit more explicit, the Internet architecture enables a wide variety of information services and other resources to work together seamlessly according to well defined standard protocols and procedures. Most of the policy issues in this proceeding appear concerned with the operation of specific components of the communications environment, such as the various networks and other computational facilities.

Encouraging "freedom of expression" in the Internet is certainly a worthwhile endeavor, and, while many individuals connect this objective with the notion of an open Internet, CNRI believes this topic should be addressed separately, either in this proceeding, or in some other venue. The basic open architecture of the Internet is a technical concept that should be considered quite separately.

2.   Global Addresses: What is meant by the Internet for purposes of the Notice (§ 8.3, Notice, Appendix A) appears to be tethered to the need for globally unique Internet addresses "assigned by the Internet Assigned Numbers Authority." First, the responsibilities of the Internet Engineering Task Force (IETF) in this context appear to be overlooked: both IANA and IETF have related roles to play. IANA and the IETF leadership coordinate regularly on such matters pursuant to the terms of the "Memorandum of Understanding Concerning the Technical Work of the Internet Assigned Numbers Authority" (RFC 2860; http://www.rfc-editor.org). Second, while the Internet Protocol (IP) is likely to remain an important component of the Internet infrastructure for many years, the Internet will likely evolve to include additional addressing structures in the future. In general, many interoperable identifier systems are

likely to become integrated in the Internet going forward. Therefore, the definition of the Internet should not be restricted only to IP addressing; and policies that enable newer, more efficient forms of global addressing than those currently deployed in the Internet now or in the future should not be excluded by definition.

3. **Meaning of Broadband**: The scope of the proposed definition of "broadband Internet access" (§ 8.3, Notice, Appendix A) is now tied to what is termed "Internet Protocol data transmission between an end user and the Internet." The wording of this definition appears to distinguish between "data transmissions" based on Internet Protocol by an end user and data transmissions that are part of the Internet. It treats the Internet as just another network or other communications capability requiring "broadband" connection services for access by external networks and other computational facilities. This is an artificial partitioning of the Internet into two fragments that are really part of a single information system, namely the Internet.

While the Internet means many things to many people, it is not itself a separate packet network. From the start, the Internet has accommodated new network technologies and new networks; and, today, there are many such networks deployed in the Internet, including, more recently, next generation networks (or NGNs). If broadband access services are based on the Internet Protocol, its logical extensions or follow-ons, then such services are intrinsically part of the Internet, not just a capability using IP for providing access independent of the Internet.

Some guidance on what is viewed as "broadband" from a technical perspective would also be helpful, such as a clear definition of the term. Would the speed of transmission of digital information define "broadband" or would the concept include the modalities of communication at "high speed" such as cable, wireless, or satellite technologies?

4. **End-to-End Principle:** The wording of the proposed definition of Internet also raises a question about whether the FCC intends to restrict the scope of the Internet based on what is sometimes termed the "end-to-end" principle. While sometimes viewed as a requirement of the Internet architecture, this is not historically accurate. Such a restriction would only serve to restrict the way in which the Internet can evolve. If the FCC were to draw a distinction between a so-called "open" Internet where the "data transmissions" are restricted to communications between "end users," then it could have the unintended consequence of fragmenting the Internet, possibly unraveling the dynamic growth of informational goods and services provided in an internet environment, and restricting its growth going forward.

The basic Internet design did not require adherence to a so-called end-to-end principle; however, for pragmatic reasons of convenience and timely deployment, the initial Internet implementation did not require any internal changes to the three DARPA-sponsored packet networks (i.e., ARPANET, Packet Radio Network, and Packet Satellite Network). This was simply an early implementation choice (see Note prepared with input from Dr. Robert E. Kahn, who was responsible for this effort at the time, available at http://sspnet.org/News/Some_Myths_about_the_Internet/news.aspx). With respect to the

so-called end-end principle, a key element in the original Internet design was the role of TCP (transmission control protocol), including IP. While IP remains the basic addressing component of today's Internet, technology continues to evolve and certain of the services and even applications that make use of IP, now or in the future, may be more effectively implemented with inputs from all sectors, including the active participation of individual networks (with suitable regulatory oversight in the public interest), rather than having those services relegated to what are sometimes called the "edges" or "ends" of the Internet. Current advances in technology allow us to go beyond these early choices. For example, CNRI's Handle System (http://www.handle.net) has been shown to facilitate high-level addressing for information structured as digital objects and has been deployed and used in the Internet environment for identifying digital objects for use in mobile programming, routing of network information, digital libraries and many other applications. It is compatible with the use of IP, but not dependent on it.

5. **Proposed Definition of Internet:** In 1995, the Federal Networking Council (FNC), working in consultation with a group of scientists, government representatives and others involved in the early Internet effort, adopted a definition of Internet in which it was recognized that, while IP was then a hallmark of the Internet, there would likely be logical extensions and follow-ons to IP developed in the future (FNC definition at http://www.nitrd.gov/fnc/Internet_res.html). Since the adoption of the FNC definition of Internet in 1995, Internet technology has evolved along many different dimensions. During the Working Group on Internet Governance (WGIG) in 2004, there was some discussion of what it meant to be the "end-to-end" principle with respect to the Internet. On that occasion, CNRI submitted a paper in which it proposed the introduction of words in the FNC's "Definition of the Internet" to recognize that innovation might take place not just at the "ends," but inside particular networks (paper available at http://www.wgig.org/docs/CNRInovember.pdf). Specifically, the revised definition of Internet would read:

"**Internet refers to the global information system that –**

(i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons;

(ii) is able to support communication using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/ follow-ons, and/or other IP-compatible protocols; and

(iii) provides, uses or makes accessible, either publicly or privately, high level services layered on, or integrated with the communications and related infrastructure described herein."

Corporation for National Research Initiatives (CNRI) respectfully requests that the Federal Communications Commission consider the adoption of the revised definition of Internet as proposed herein.