**IPv6 Diffusion on the Internet Reaches a Critical Point**

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The focus point of this article is the need to switch from IPv4 to IPv6 as the number of unique IPv4 addresses begins to run out. According to the authors, the purpose of this paper is threefold and includes: 1. to offer an assessment on the current level of IPv6 adoption on the Internet with the use of six metrics, 2. to present a model that predicts the diffusion of IPv6 on the Internet, and 3. “to assess how Rogers’ diffusion model translates from its “innovation” foundation to “technology advancement” as applied to the large scale diffusion of protocols on the Internet [4]”. The authors stress the need for a qualitative analysis of the current levels of IPv6 adoption and the fear that overall IPv6 adoption will reach a level of “critical mass” which will lead to a potentially rapid and disastrous level of IPv6 adoption [4]. The author’s look to address three main research questions: 1. what is the current level of IPv6 adoption on the Internet among Internet stakeholders, 2. which IPv6 adoption metric best represents overall level of IPv6 diffusion on the Internet, and 3. how will IPv6 adoption likely progress on a normal distribution curve over time? [4].

The authors cite many previous works in their paper but the work conducted by Everett Rogers appears to be a basis for the authors’ research and analysis. Specifically Rogers’ diffusion of innovations theory is the major operand in which the authors’ conduct their empirical research and analysis. Rogers’ diffusion of innovations theory seeks to explain at what rate new ideas and technologies spread. Rogers does this by dividing the users into three groups: innovators, adopters, and laggards. “He then uses the mean and the standard deviation to map adopter classifications onto a normal distribution curve to define a population’s percentage of classification and their thresholds [6].”

The authors wished to study the diffusion of IPv6 quantitatively and hence provide insight into its transition. They planned to do this by applying the diffusion of innovation theory to six metrics of IPv6 adoption. These metrics included IPv6 users, active BGP entries, RIR IPv6 allocations, unique IPv6 as autonomous systems, unique IPv6 as system paths, and AAAA from top 25K (IPv6 enabled websites). They collected data from four datasets over a period of eight years [8].

Through tables and graphs, the authors show the results of their research. The results show the marginal percentage increase of IPv6 from 2009 to 2017. The results find a near perfect correlation near the various IPv6 adoption metrics with respect to each other. A line graph shows the number of users accessing Google through IPv6. The graph shows a marked increase in users from 2014 to 2017 when compared to 2009 to 2014. The first 2.5% of these users (2009 to 2014) are marked as the innovators by the authors and the next 15.5% of users (2014 to 2017) are marked as early adopters. Another table shows that the expected date of reaching certain milestones in IPv6 adoption percentages (16%, 50%, and 84%) have decreased over the past few years (2009 to 2014). A line graph shows an accelerated adoption rate of IPv6 when compared between the years 2009 and 2014 [12].

Form their research; the authors conclude that IPv6 adoption is nearing a critical mass point which will cause adoption to accelerate in order to meet up with the demand of the ever increasing Internet user base. The authors further project that the IPv6 adoption rate will reach 50% somewhere between March of 2021 and October of 2022. The authors recommend that commercial enterprises should, regardless of business model, begin planning to deploy IPv6 in order to increase their market shares. They also state that higher education institutions that have not already incorporated IPv6 into their communication and computer networking curriculums should immediately do so as they are already behind the 8-ball [15].

This paper brings into the forefront a question that many people in the communication and computer fields have been discussing for a while; when will Internet users have to make the switch from IPv4 to IPv6? This paper brought into light for me just how long IPv6 has been around for commercial use and yet how it somehow has not taken off. Rogers’ diffusion of innovations theory shows just one way in how experts in the field have been trying to predict just when IPv6 will truly take off. The authors of this paper predicted that IPv6 would reach a critical mass point somewhere soon after their paper was written (2017). Its mid-2019 now and we still have not seen a rapid acceleration in IPv6 adoption and it appears that we are still a long way away from the 50% IPv6 adoption projection (October of 2022 by the latest) made by the authors of this paper.

References

Pickard, John, et al.*IPV6 Diffusion on the Internet Reaches a Critical Point*. The Journal of Technology, Management, and Applied Engineering, Feb. 2018, www.researchgate.net/publication/323416689\_IPV6\_diffusion\_on\_the\_Internet\_reaches\_a\_critical\_point.