

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, DC 20554

In the Matter of )  
 )  
Protecting and Promoting the Open Internet ) GN Docket No. 14-28

**COMMENTS OF NOKIA**

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**Comments of Nokia**

Nokia herein submits these comments pursuant to the Commission’s *Notice of Proposed Rulemaking* (“NPRM”).<sup>1</sup> Nokia is a global leader in the areas of mobile broadband network infrastructure and location-based and mapping technologies. Nokia has three thriving businesses: the mobile broadband infrastructure business, Nokia Networks; the location intelligence business, HERE; and Nokia Technologies, a technology development company with significant intellectual property activity. Nokia maintains a global presence with more than 55,000 people and extremely active research and development activities that exceeded \$3.4 billion in 2013. Nokia is one of the largest and most successful mobile broadband infrastructure companies in the world with wireless operator customers in more than 100 countries. This provides an important set of experiences regarding the evolution of mobile networks, current challenges, and the dangers to innovation and growth posed by rules beyond those truly needed to ensure an open Internet. Unless otherwise indicated, Nokia’s comments are directed at the wireless broadband marketplace and the appropriateness of network neutrality proposals for wireless services.

**I. General Comments:**

The national conversation about network neutrality has been long, with periods of tremendous regulatory uncertainty. The Commission’s 2010 *Open Internet Order* (“Open

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<sup>1</sup> In the Matter of Protecting and Promoting the Open Internet, Docket No. 14-28, *Notice of Proposed Rulemaking*, FCC 14-28 (rel. May 15, 2014) (“NPRM”).

Internet Order” or “Order”) was an important step in creating predictability about the rules applied to network operator conduct, including prohibited practices and transparency requirements. In the period following the adoption of the *Order*, the key decision to recognize that wireless services are inherently different from a technical and network management perspective, and therefore should be subject to fewer requirements, enabled significant investment and innovation to take place. From 2006-2009, wireless investment in the United States declined, however, from 2010-2012 following the *Order’s* adoption, total capital expenditures by U.S. wireless carriers increased.<sup>2</sup> The reversal of the declining investment trend is striking and it has been sustained in the three years since adoption. Nokia believes that the certainty provided by the *Order* played an important part in improved monetization of data traffic and ultimately in significant improvement to the infrastructure investment environment.

Nokia believes that it would be a mistake for the Commission to make any significant departures from key decisions of the *Open Internet Order* because it would usher in a new period of uncertainty about the scope and applicability of rules. For example, were the Commission to reclassify broadband services under Title II of the Communications Act, as some have proposed, it would create considerable compliance costs and a period of tremendous uncertainty as the Commission considered which of the onerous provisions applied to common carrier services would be extended to broadband and which would be the basis of regulatory forbearance. Given that the Commission interprets the appeals court’s decision as confirming its authority to adopt network neutrality rules, it is surprising to see the NPRM include reclassification of broadband under Title II as a possible outcome of this proceeding.<sup>3</sup> Nokia believes reclassifying broadband services as telecommunications services subject to common carrier treatment is unnecessary and likely to produce significant negative changes to the investment and innovation environment.

Nokia also strongly believes that the evidence is clear that wireless services and networks

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<sup>2</sup> *Sixteenth annual CMRS competition report* (2012).

<sup>3</sup> NPRM, 9 at 23.

remain fundamentally different than wireline networks both in the availability of capacity and in the predictability about demands. It is therefore appropriate for the Commission to continue recognizing these differences and to apply a different framework for non-discrimination that allows greater flexibility to wireless operators to manage network demands. The starting point for this would be reaffirming the 2010 *Open Internet Order's* framework for the treatment of wireless services.

## **II. The multi-sided market and the implications for Internet openness**

The multi-sided market between consumers, wireless operators, and application and over-the-top (“OTT”) providers is still rapidly developing. It is extremely difficult to predict the applications, services, and use cases that will emerge even in the next few quarters. Nokia believes that applications and services that provide a more personalized network experience, require reduced latency, and may require network prioritization to ensure appropriate operation will continue to emerge based on the evolution of complimentary technology and consumer demand for more sophisticated capabilities from the mobile network.

Capabilities such as remote health care monitoring, health service delivery by mobile networks, and self-driving cars will all require networks that can ensure a level of service quality (“QoS”) current networks may not be able to fully support. This is true as well for current generation services like streaming video and online gaming via mobile device that are consuming a rapidly increasing share of capacity in networks. Low fault tolerance technologies will require new investment in research and development activities to expand capacity, increase processing power, and reduce latency. If the Commission establishes premature rules that seek to restrict activities in this still evolving area, it could severely limit the development of business models that would enhance the consumer experience. At the same time, such rules could prevent the creation of additional value throughout the entire mobile broadband ecosystem, value that is needed to fund the extensive research necessary for network performance and capability to keep pace with these

marketplace demands.

Nokia believes that it is premature for the Commission to consider rules that prohibit anything but blocking and throttling for non-network management based reasons at this time. Consumers have more opportunities to interact directly with application, service, and content providers and OTT companies than at any previous time, and application and service providers have been looking increasingly to work with operators on ways to mitigate congestion and assure QoS. It is unwise to lock in a blanket, inflexible ban on future conduct or attempt to prophylactically anticipate and regulate an emerging marketplace. Wireless networks have been at the leading edge of innovation and job creation, which has benefited the economy, consumers, businesses, and governments. Wireless data services unencumbered by constricting regulations that attempt to allay every potential act of discrimination, however likely or unlikely in practice, have opened unfettered opportunities for startups, small to medium businesses, and large companies to innovate services that have benefitted the consumer. As we move now from the Smartphone era to the Internet of Things, the Commission needs to consider that over reach on regulations may in fact diminish the viability of the next life saving idea for healthcare or next streaming service for automotive telemetry to prevent accidents.

**III. The trend towards the caching of content closer to end-users and whether it increases lock-in problems for edge companies or, separately, limits the number of pathways by which an edge provider's output can effectively reach current or potential end-users**

It is extremely important that the Commission recognize that caching is not synonymous with prioritization. Some parties advocating in this proceeding have conflated these activities and suggested that caching of content closer to the end-user is a practice that requires intervention by the Commission. Caching is a tool for efficient management of network resources and for vastly improving the quality of the user experience. The speed of light is immutable in its relationship with latency. Therefore, caching content closer to the user reduces the impact of distance on the

user experience, which allows: 1) augmented reality to be usable, 2) reduces wireless energy consumption benefiting the CO2 footprint, and 3) significantly improves wireless network efficiency to serve more users and applications due to faster service delivery. Caching is also not a new concept; it is a business model that arose in response to demand from the very edge community the Commission notes it seeks to protect with its proposed rule. Edge providers have consistently sought to reduce response time and improve the user experience. Google has noted in many forums, for example, that a response rate of .25 seconds is optimal for an exceptional user experience compared to the 7 to 20 seconds present on many earlier generation wireless networks.<sup>4</sup> Along with reduced response time, caching applied in the core of wireless networks can reduce interconnection fees and reduce the amount of backhaul traffic leading to a much more efficient network condition.<sup>5</sup> The Commission should recognize that caching has a substantial number of benefits for consumers and that taking action to regulate or limit caching arrangements would be detrimental to consumers and innovators alike.

Nokia is not aware of instances in which an entity that offers content of various kinds has been unable to reach consumers because of a decision not to pay for elective caching in either wireline or wireless networks. In light of the considerable benefits that caching offers to both end-user customers and the edge companies noted by the Commission, it would seem that concern about caching is misplaced. Further, if the Commission were to implement rules that limit or condition the availability of caching, it would be highly disruptive throughout the entire mobile broadband ecosystem. Infrastructure providers like Nokia have invested heavily in the research necessary to enable and advance caching due to customer demand, and just as importantly, edge companies are designing current generations of technology and services that rely upon caching capability to reduce

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<sup>4</sup> See, e.g., <http://www.nytimes.com/2012/03/01/technology/impatiant-web-users-flee-slow-loading-sites.html?pagewanted=all>

<sup>5</sup> The Business Case for Caching in 4G LTE Networks. LSI White Paper (2013), available at [http://www.wireless2020.com/docs/LSI\\_WP\\_Content\\_Cach\\_Cv3.pdf](http://www.wireless2020.com/docs/LSI_WP_Content_Cach_Cv3.pdf)

response time. It would be very dangerous for the Commission to intervene in this area absent compelling evidence of a real, rather than hypothetical, concern about lock-in.

#### **IV. The feasibility of a broadband provider blocking or degrading based on the location or neighborhood of the end-user**

It is theoretically feasible that a broadband provider could block or degrade traffic on a location specific basis. It is unclear why a provider would do so, or whether the Commission can cite any instances in which this has occurred. As the ability to monetize data utilization is improved on networks, particularly wireless networks, it is clear that operators would have reason to incentivize greater utilization rather than block or degrade traffic, which would tend to depress utilization. This is especially true in areas where smartphone penetration and network utilization are historically lower. Part of the limit on network availability in key areas has been the difficult business case for operators. As the Commission's broad efforts to improve adoption bear fruit and smartphone technology utilization increases, urban neighborhoods and rural areas that have traditionally been low utilization areas will offer heightened demand. It is unclear exactly why the Commission would be concerned in the face of this escalating demand that providers interested in monetizing greater utilization in these areas would adopt policies that reduce consumer interest. Even if the Commission's concerns about location-based discrimination were demonstrable, the appropriate remedies are already contemplated in the NPRM. A prohibition against blocking or throttling of traffic except for reasonable network management purposes, and a requirement that traffic be treated at relative parity under these circumstances would adequately provide protection against targeted discrimination that would justify the Commission's inquiry.

That the Commission asks this set of questions is emblematic of a growing concern among industry that the FCC is focusing so much on the "potential" for abuse and bad conduct that it is not fully analyzing or appreciating the considerable benefits that emerging capabilities and business models can bring to consumers. It would be informative for the Commission to inquire about the

increased monetization opportunities that caching and prioritization, among other developing capabilities, could introduce into the ecosystem and the increased research and development and infrastructure investment that will follow. Exploding demand creates technical challenges and necessitates a new generation of research in the infrastructure sector to improve network performance and capability. While it is appropriate for the Commission to show concern for the edge community as part of the network neutrality analysis, it is of equal importance to recognize the tremendous amount of innovation realized from the mobile broadband infrastructure community. This innovation is absolutely essential to enabling the network environment that will allow emergent technologies in the edge community to succeed.

Given the well-understood challenges that the infrastructure community has faced with flat to decreasing operator spending globally, it would work counter to many of the Commission's mobile broadband ambitions to artificially limit business models and use cases that could create value throughout the entire ecosystem and fuel a new generation of research. There is very limited evidence available suggesting bad conduct. Furthermore, the Commission has the ability to adopt a framework in this proceeding that affirmatively permits innovation while providing reasonable safeguards to ensure an open Internet. Therefore, Nokia recommends that the Commission seek more information regarding the benefits to consumers and the broader ecosystem of caching, prioritization, and other value enhancing activities before developing restrictions on their use.

**V. Excluding certain content from an end-user data cap and whether these tools could be used to exploit market power or reduce competition.**

Data caps and the resulting end-user rationing of data utilization is an artifact of rapid evolution of the wireless marketplace and pricing practices that failed to adequately adjust to these dynamic pressures. The Commission's own series of wireless reports detail a history in which the paradigm shifting introduction of smart devices like the iPhone led to an almost instant explosion of data on wireless networks. Data utilization evolved faster than network capacity and processing

capabilities leading to the imposition of utilization caps. The Commission needs to recognize this context and how it impacts content and application companies to truly understand the emerging interest in excluding traffic from the caps.

The existence of data caps impacts content and OTT companies because these entities see a decline in traffic to their websites, applications, and other service platforms as the month progresses due to rationing by the consumer. Many websites and services rely on funding from advertising, so a decline in wireless traffic during certain periods of a month or usage cycle understandably has a direct impact on revenue for these entities. Certain services become very difficult to sustain in the presence of data caps. Streaming of live events such as a baseball game or soccer match for example would consume much of a user's data allotment for the month or result in large overage charges. As a result, it is not surprising that in many cases it is the content and OTT community openly discussing the possibility of subsidizing or otherwise excluding a consumer's usage to their website or service from the user's wireless data cap.

At least one hypothetical concern associated with sponsored data approaches would be a wireless operator offering to in effect "bundle" a highly attractive application or service with the operator's own wireless service by excluding data usage related to that application or service from the data cap. This could occur with or without the OTT or third party application provider paying for the exclusion. In theory, an operator could package enough exemptions together to make their service look more attractive than a competing operator that is not in a position to forego monetization by exempting data from a cap. An operator might even pay a strong OTT brand to offer its service bundled with the contract for wireless services. And, of course, some commenters have suggested that operators could eventually offer services that compete with OTT and application providers and exclude usage associated with their offering from a user's cap while refusing to do so for the competing OTT or application provider. At this time, it appears that all of

these concerns are hypothetical. Nokia believes that the majority of the instances in which exclusion from wireless data usage caps have been contemplated or executed to date are not examples of the potential concerns previously noted, rather they are instances in which an OTT or application provider is experiencing negative effects from user data caps and is seeking a remedy in the form of a third party subsidization of the usage.

Nokia believes that comments from some parties that third party payment or subsidization would endanger the openness of the Internet are unfounded. Indeed, there are numerous examples in other industrial areas where a party other than the ultimate user pays for transport. These include cash on delivery (C.O.D.) arrangements; collect phone calls; and 1-800 services. Given the rapidly changing marketplace dynamics, including the emergence of new applications and services, and higher levels of smart device penetration that increase wireless traffic, it would be premature and potentially damaging to enact rules that prohibit arrangements that create value within the ecosystem while allowing users additional utilization of wireless data. Further, the Commission contemplates a rule preventing blocking or throttling of competing services and content and transparency rules that require disclosure about network management activities as it did in the *Open Internet Order*.

It is not clear why these tools would be insufficient to allow the Commission to take a “wait and see” approach. Nokia believes this will allow for further evolution of the marketplace and a potential realignment of pricing practices that matches the demands currently placed on wireless networks and the needs of content and OTT providers for continual consumer utilization. Implementing restrictions without regard to the marketplace realities leading to the exploration of arrangements to exclude data from usage caps is fraught with risk to the content and OTT community which are both heavily reliant on predictable and consistent utilization, and to others including consumers that will be called upon to continue rationing their data usage. This is another

area where the inquiries about the “potential” for bad conduct, without compelling evidence of abuse, can actually obscure marketplace realities and opportunities. There are a range of potentially beneficial examples of sponsored data activities, including school districts subsidizing access to educational resources and healthcare providers sponsoring access to health resources, which could be unwittingly foreclosed by premature regulation. Nokia believes caution should be observed before adopting rules in this area.

## **VI. Scope of the Rules**

The Commission seeks comment on several decisions contained in the *Open Internet Order* and whether those decisions should be retained or modified. Nokia supports the Commission’s 2010 decision to exclude multi-channel video and dial up Internet access from the definition of broadband Internet access service in the *Open Internet Order* and recommends that these exclusions remain as part of the final rule in this proceeding. Similarly, Nokia supported the decision to exclude enterprise services and virtual private network offerings in 2010 and suggests that the Commission continue that policy in the current proceeding.

With respect to specialized services, Nokia believes that this is the most important area of inquiry, one where the Commission has an opportunity to provide important safeguards to preserve an open Internet while at the same time creating an avenue for wireless carriers to ensure appropriate QoS is available for activities that need it. Improved monetization from the offering of certain specialized services also has the potential to alter the trajectory of research and development activity and infrastructure investment in ways that are key to the future of the mobile broadband ecosystem as we progress towards 5G. Nokia believes that the Commission should reaffirm its decision to affirmatively allow specialized services and seek this opportunity to further define and enable their availability.

Nokia supports the definition of specialized services developed by Digital Europe and

suggests that the Commission give strong consideration to supporting a similar approach. As a multi-industry association, Digital Europe includes companies from almost every segment of the Internet ecosystem including infrastructure vendors, handset manufacturers, and software companies. Digital Europe recently defined specialized services in a network neutrality white paper:

*“Specialised services” are designed for specific content, applications or services, or a combination thereof. Such services rely on traffic management or other networking techniques to ensure the desired or necessary level of network resources that determine subscriber experience (such as capacity, quality) with the aim to securing enhanced quality characteristics. They are delivered from end-to-end and are not marketed or widely used as a substitute for Internet access services.<sup>6</sup>*

There is considerable benefit in the Commission aligning its view of specialized services and network neutrality with the European Union (EU) due to the relative size of the markets and the companies located in, and doing business in both markets. Nokia has advocated in the EU for a framework that permits the offering of specialized services on a transparent and voluntary basis to end-users and application and OTT providers that seek to guarantee QoS. Nokia believes that transparency and choice are key elements of safeguarding an open Internet. As long as specialized services are not offered as a general substitute for Internet access service and are non-exclusively available to any entity that wishes to elect treatment as a specialized service, Nokia does not believe there is a conflict with the important principle of network neutrality.

As a general matter, differentiation of traffic is a more economic approach to efficiently distribute a scarce resource like network capacity than an undifferentiated offering in which all traffic, regardless of type, is required to receive equivalent priority and resource support in the network. With differentiated offerings based on a variety of dimensions such as speed, time of day, or application, end-user customers benefit from the ability to choose a type of service that aligns with their cost limitations and relative valuation of service terms. Improved monetization of data

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<sup>6</sup> Digital Europe. Technical Paper on Specialised Services and Network Traffic Management (March 7, 2014).

traffic would also more accurately reflect operators' costs and support increased investment.

There are other advantages to the Commission adopting a robust specialized service definition that would permit prioritization and differentiation among data traffic. Entities offering a range of services and applications for which QoS is essential could select a specialized service secure in the knowledge that appropriate bandwidth and network resources will be available to provide the high level of quality and consistency needed to ensure services with high sensitivity to latency. Within the specialized service framework that contains permissive, voluntary prioritization the Commission could ensure relative parity of treatment. For example, if online gaming for mobile platforms were deemed a type of service necessitating priority treatment, end-users and/or providers of such services could choose to pay for a guaranteed service level with limited latency. Or, they could choose not to do so based on the technical design and fault tolerance of their product. As the EU has proposed, all traffic receiving elective prioritization would be treated with relative parity meaning a single company could not receive substantially better service by paying more. Similarly, all entities providing the same or similar service that elected not to receive prioritization would likewise receive relative parity in terms of access to network resources and bandwidth as all other non-prioritized traffic. In combination with a meaningful "best efforts" standard, and a no blocking rule, this relative parity model provides an important safeguard.

Nokia believes that the appropriate approach is to treat wireless differently than wireline services and reaffirm the approach taken in the *Open Internet Order*. However, if the Commission nevertheless determines that it will apply a non-discrimination rule to wireless services, a combination of a relative parity treatment requirement and a no throttling except for reasonable network management requirement would represent a superior approach to the Commission's proposed "commercially reasonable" standard. One possible approach could be to: 1) make the selection of specialized treatment a wholly voluntary election of the end-user or application and

content provider, 2) ensure that deals may not be exclusive to a single party and must instead be offered on the same terms (price, etc.) to all who qualify for and select specialized treatment, 3) require relative parity of treatment priority among all entities electing specialized treatment while ensuring best efforts for the traffic of entities not electing specialized treatment, and 4) prohibit throttling or other degradation of transport based on all reasons unrelated to reasonable network management.

While the foregoing is not a formal proposal, Nokia believes that if the Commission insists on adopting non-discrimination rules for wireless services, this type of model is superior to a commercially reasonable approach applied on a case-by-case basis. Transparent terms, voluntary election, non-exclusivity, and relatively equitable availability of network resources and bandwidth are all essentially ingredients of a commercially reasonable offering and could be a proxy for whether an arrangement is reasonable. Firmly fixing such a framework with a formal definition of commercial reasonableness rather than reviewing each arrangement on a case-by-case basis (as the Commission proposed to do) is a more objective and enforceable paradigm that can be executed given the Commission's resources. It will be difficult for the Commission to obtain timely and accurate information of widely varied private agreements for specialized services and then make non-arbitrary decisions about whether the facts and circumstances of that arrangement are commercially reasonable. Therefore, Nokia recommends that the Commission not adopt a commercially reasonable standard that will be applied case by case subjectively, which we believe is fraught with uncertainty for the marketplace and challenges to enforcement. It would be more appropriate to not apply a non-discrimination principle to wireless services at all, including to specialized services, but the approach Nokia described in the foregoing discussion would be superior to a commercially reasonable standard.

Respectfully submitted,

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