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How Transport Providers Can Profit from Net Neutrality by Embracing 5G

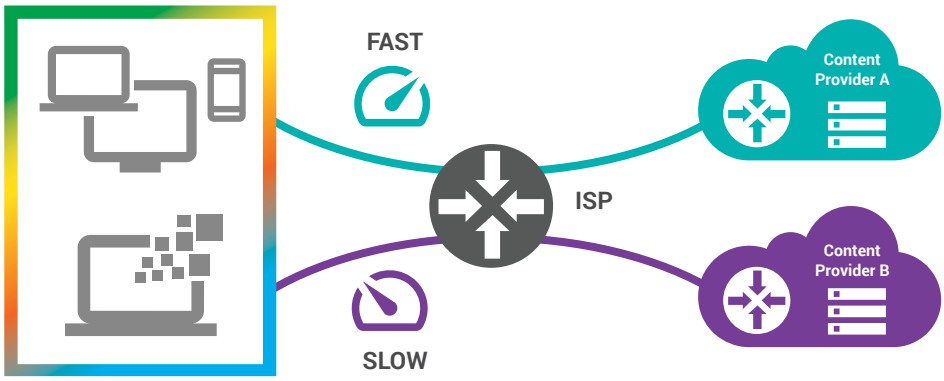
White Paper

Net Neutrality – Debate and Opportunity

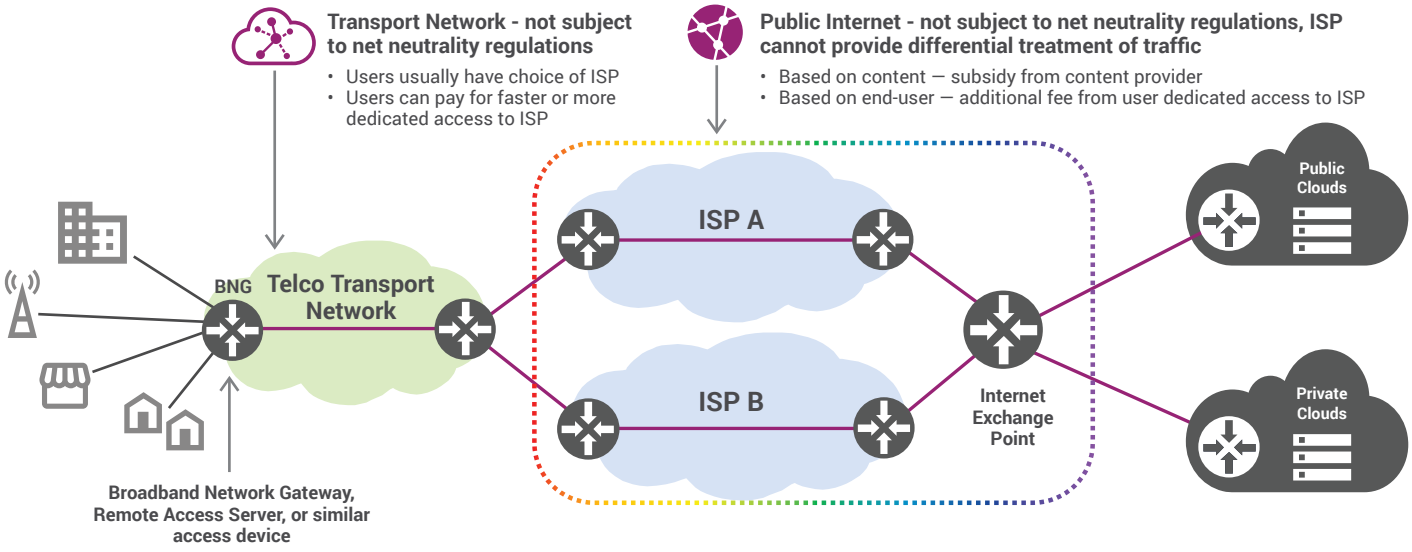
Under a net neutrality regime, Internet Service Providers (ISPs) must treat all public Internet traffic equally. They may not intentionally block, slow down, or charge users money for specific online content.

Leading proponents of net neutrality, such as human rights advocates and smaller content providers, say it is needed to protect freedom of information exchange, create a level playing field for competition, and promote net neutrality are the ISPs themselves and larger content providers. They claim that mandating equal treatment of Internet traffic reduces financial incentives to build out the public Internet, and from their perspective, reduces competition. They also state that neutrality raises operating costs, or removes a mechanism to compensate for these costs, which they must then pass along to end-users.

While net neutrality enforcement varies greatly around the world, looking at the big picture, we can conclude that net neutrality will largely exist. The good news is that regulation always creates new opportunities. In this WP, we focus on how transport providers in particular can profit from assisting new 5G services to "work around" net neutrality barriers.



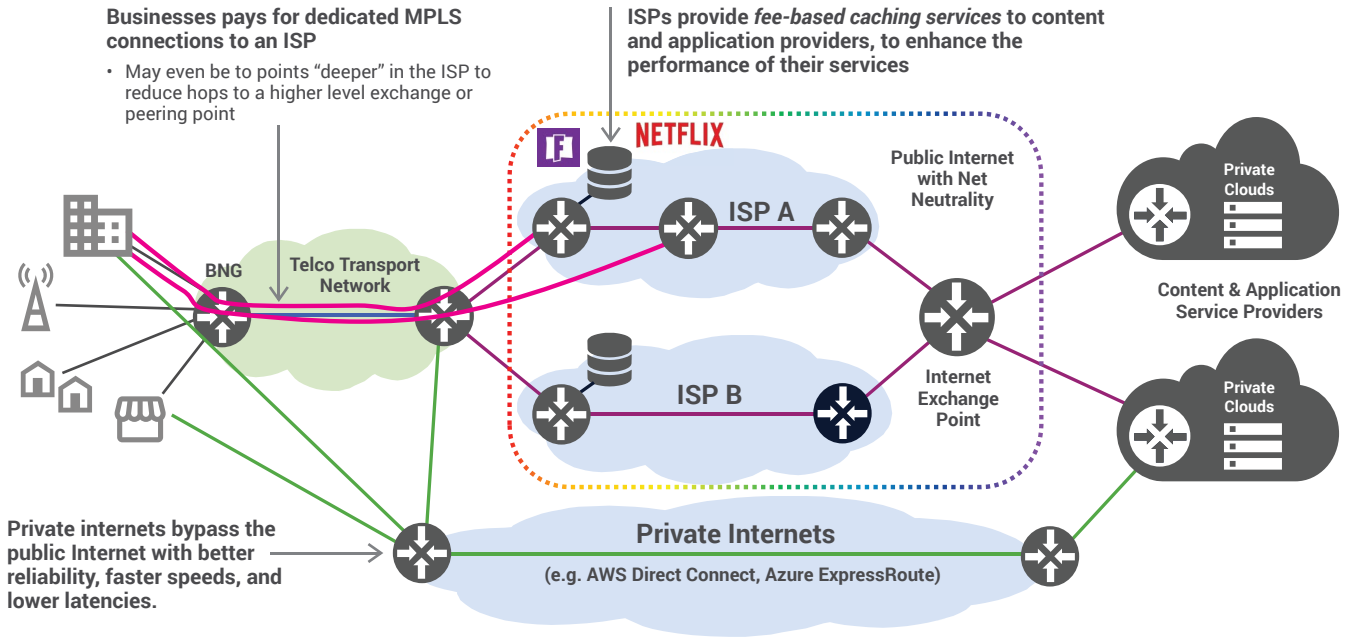
Not Allowed Under Net Neutrality!



Working Around a Neutral Internet Today

Contrary to popular belief, net neutrality regulations do not affect everyone involved in the delivery of Internet services; they only apply to ISPs supporting the public Internet. They do not apply to content providers, nor to telcos who use their transport networks to deliver access to ISPs. Even when the telco and ISP are the same corporate entity, regulators treat these functions differently.

Here are three ways that end-users and content providers legally overcome a neutral Internet today, which treats all traffic equally, to obtain or deliver higher performance.



Preferred Access

For regulatory purposes, the public Internet comprises ISP routers that implement "neutral" routing decisions based on the Internet Protocol. Transport facilities that connect traffic from end-users to these routers are not part of the regulated public Internet. Large businesses take advantage of this by paying telcos for dedicated connections to ISPs. This removes bandwidth limitations caused by shared access with other users. Moreover, when businesses pay more for access deeper into an ISP's Internet infrastructure, they also remove time-consuming router hops, further improving their performance experience.

Consumers, who cannot afford dedicated connections, can pay for higher shared bandwidth at the telco broadband network gateway (BNG). This provides their traffic with some preference by the telco transport network on its way to and from their selected ISP.

Private Internets

With private internets, end-users and content providers bypass the public Internet to obtain faster speeds and lower latencies. Typically, private internets are provided by large content providers as an extension of their cloud hosting services (e.g. AWS, Azure), or by large content-neutral cloud providers (e.g. Equinix). Enterprises often connect directly to a private internet via dark fiber or WDM. Other users obtain various tiers of dedicated or preferred shared access from the telco to the private internets in the same way they access the public Internet.

Content Caching

Content caching enables content and application providers to offer highly responsive services to end-users. In effect, the content/application providers move their presence closer to the end-user. While ISPs enable caching services, this does not break net neutrality.

Dynamic Transport Opportunity for a 5G World

A Proposition for Change

To summarize the situation until now, end-users and content providers will find a way to 'work around' regulated ISPs to achieve better performance, when they can afford it. In the case of end-users, this is primarily large businesses paying telcos for preferred access – using fixed landline facilities, and on a dedicated basis – to the public Internet or to private internets.

The proposition is that 5G will turn this on its head. It will enable an evolution to where preferred access with service assurance is available to all fixed and mobile users, and on a dynamic per-use basis. Telcos will provide this dynamic preferred access, either through enhanced connectivity to the public Internet, or via connectivity to private internets.

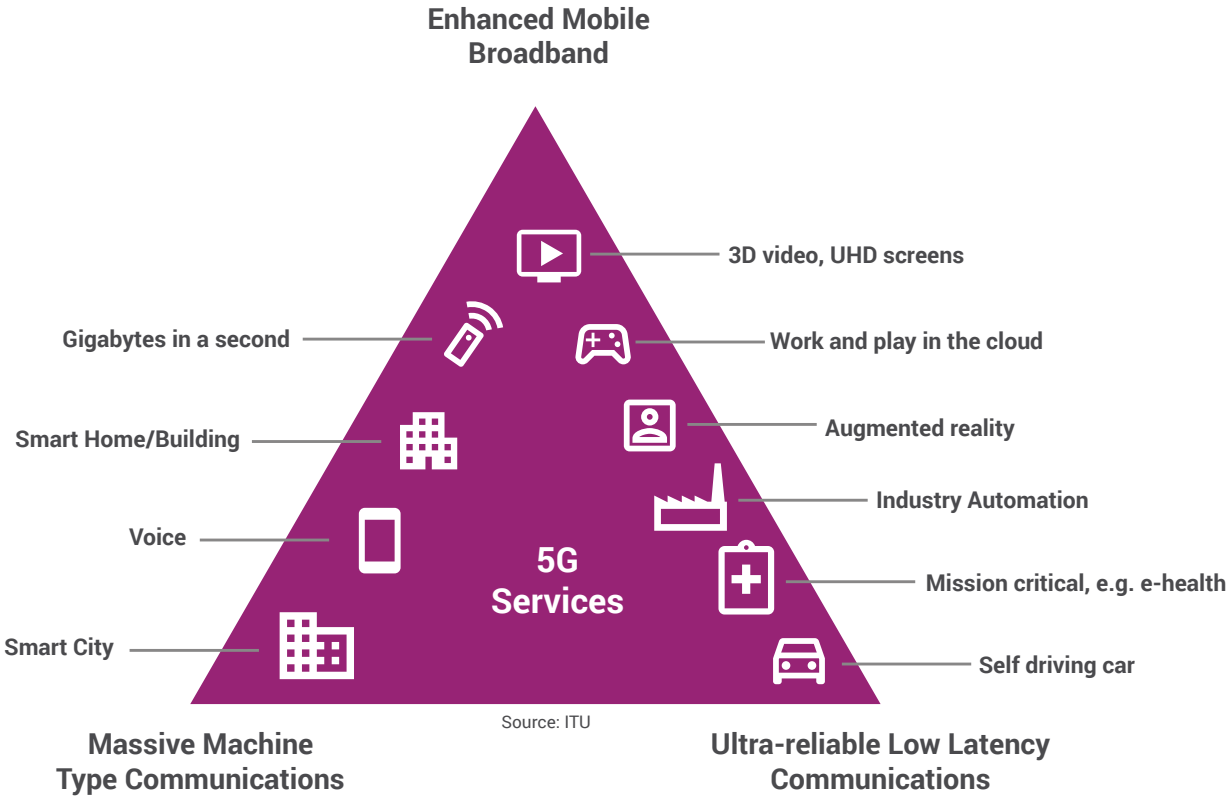
This process will start with 5G users, to meet their unique needs. Once the mechanisms are in place, telco transport providers will be able to extend this capability to all fixed and mobile users.

	Today	Future
Type of User	• Consumers and businesses	• Consumers and businesses
Access Media	• Fixed (landline)	• Mobile and fixed
Duration	• Permanent – full time	• Dynamic – per use
Service Assurance	• Yes, taking advantage of dedicated facilities	• Yes, by leveraging dynamic orchestration and restoration mechanisms when needed

5G Is a Candidate for Driving This Change

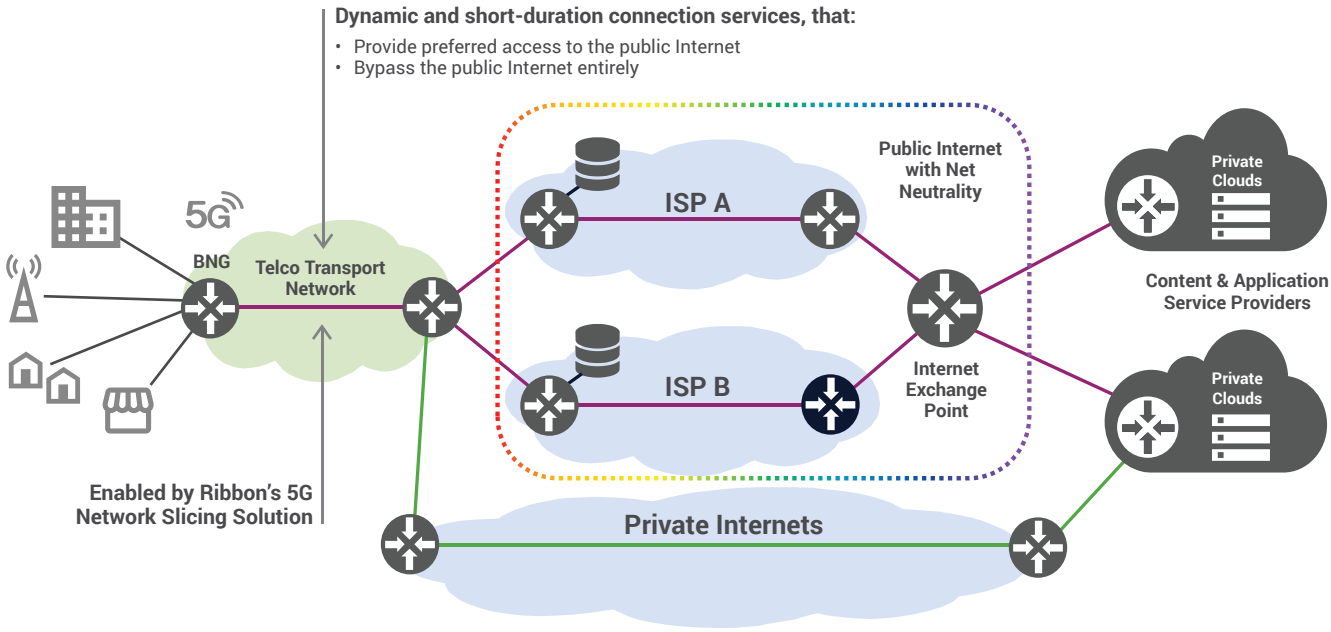
Opportunities often arise in response to a problem. In the case of 5G, the problem is guaranteeing an ability to obtain 5G's advanced service capabilities end-to-end.

5G is much more than a next generation wireless technology. 5G is revolutionary in that it is hard-wired for multiservice capabilities. Based on the 3GPP standard, a 5G SIM card can support multiple service profiles with specific network access methods associated with each profile. An end-user can program-in different levels of performance for different services. For example, an end-user might specify a 5G eMBB broadband for regular web browsing, but select a mixed profile of URLCC with eMBB broadband when accessing high-definition streaming or AR/VR services. This multiservice media capability is a telecom first, with enormous potential for disruptive service models. It can get even more interesting with the introduction of eSIMs that can fuel an even more competitive environment.



Source: ITU

This will give the ability for 5G users to pay for and obtain premium connectivity to the public Internet or to private internets, to obtain the highest level of end-to-end performance. This is conceptually similar to what businesses pay for today, with one major difference. Because 5G is mobile, and users only access Internet applications intermittently, this preferred connectivity would not be permanent. It would be setup dynamically on a per-use basis.



5G Has the Ingredients to Make This Succeed

The major hurdle for enabling mass-market premium connectivity, delivered dynamically, is the upfront cost. In the case of fixed networks, where this would entail upgrading the entire DSL/GPON/DOCSIS infrastructure all the way to transport and OSS/BSS systems, in the hope that enough users will pay a premium, makes no economic sense.

However, 5G's mobile and multiservice nature brings multiple economic and technical advantages that makes implementation much more feasible. It has all the ingredients in place to assign connectivity resources dynamically – from a pool of shared resources – to specific service requests:

01 A technical basis already exists for dynamic allocation of resources for mobile services. Mobile networks are built with media management and multiple service types in mind, with the inclusion of IMS (IP multimedia subsystem) since 3rd generation mobile networks. This created a technical foundation for allocating resources to services on the fly. MNOs have also learned from IMS how they can profit from value-added end-user services (e.g. text messaging, conferencing) or infrastructure services (e.g. authentication, accounting) beyond pure connectivity.

02 Mobile, as the primary media for Internet use, will create demand for preferred connectivity services. Mobile is already the main media for Internet content and applications consumption, and its share versus fixed media is increasing. According to the Visual Networking Index, by 2022, mobile and Wi-Fi only devices will account for over 75% of Internet traffic.

03 Mobile broadband packages are metered, laying the groundwork for 5G users to pay for tiered connectivity services. Compare this with fixed broadband packages that are not metered. Mobile network operators (MNOs) have educated end-users to pay premiums for tiered levels of mobile connectivity. They created mobile plans based around a neutral Internet, including arrangements that take advantage of net neutrality gray areas, like zero-rating.

04 Mobile users consume traffic and services on-the-fly and on-demand, making the network much more agile and dynamic by design. A mass market of 5G users will use services intermittently. This makes pooling of resources economically viable and paves the way to creating various tiered service and connectivity models.

05 5G's architecture lends itself to resource pooling for dynamic services. The wireless "last mile" by definition uses a resource-pooling model, from the device eSIMs to the radio network, through the xHaul. Moreover, upgrading the fixed infrastructure for this last mile (to increase effective end-user speed from 100Mbps of 4G to 1Gbps of 5G, for example) is not overly expensive.

Moving inwards from the RAN, the 5G architecture extends to distributed, cloud-based management and control, including multi-access edge computing (MEC), and a virtual and disaggregated next generation core (NGCORE). This obviously leads to implementation using resource pooling.

Solution Lies With a Dynamic Telco Transport Network

However, there are obstacles to delivering all of 5G's service capabilities end-to-end. While we can create tunnels with specific performance characteristics through the RAN (radio access network and front haul) for the different services, there may be bottlenecks in the end-to-end connectivity to the content or application provider. These would inhibit the 5G user from getting the desired or expected performance.

Any performance bottlenecks preventing 5G users from obtaining an optimal Internet experience lie either in the telco transport network connecting the RAN to the public Internet, or within the public Internet itself. However, net neutrality prohibits doing anything within the public Internet that is service-specific. Consequently, it's up to the telco transport network to provide the solution to the 5G performance bottleneck problem, or as good a solution as possible.

In other words, the transport network must implement "premium connectivity services for a price – delivered on a per-use basis" to the mobile/5G mass market.

The good news is that independent of 5G, transport networks are achieving new levels of flexibility and software control that make dynamic allocation of resources possible. This includes capabilities, such as dedicated queues for different traffic types, centralized traffic-engineered segment routing, flexible allocation of hard resources, such as optical channels, and sophisticated cloud-native SDN algorithms (moving over time to AI/ML) to control all the moving parts.

Combine these dynamic transport capabilities with all of the favorable mobile/5G aspects listed above – foundation for dynamic allocation of resources, largest Internet user group, tiered pricing established, intermittent use of services and connectivity, architecture based on shared resources in RAN and core –the conclusion is that telcos have a solid technical and economic basis to build the desired solution.

Telcos can leverage their dynamic transport infrastructure to engineer a solution based on statistical sharing of resources in this infrastructure, to deliver preferred connectivity dynamically, and on a per-service use. Another way to look at this is that telcos become an intermediary, connecting the shared resource architectures in the 5G RAN and Core, with their own shared resource solution. As 5G mobile users become the largest group of Internet users, this suddenly makes time-sharing of these transport resources economically feasible. This could never have been the case for fixed services or single mobile service mass market.

The end-user benefits from a guaranteed high-speed experience for an incremental fee. It is also feasible that the content or application provider can subsidize the preferred access cost.

This is indeed a golden opportunity for telco transport providers serving mobile operators. It leverages 5G to create a new source of revenues through tiered pricing for connectivity services. Moreover, once these dynamic connectivity mechanisms are in place for 5G services, the telcos can extend this approach and associated benefits to all mobile and fixed-access users. People will be able to enjoy high-definition video, lightning response time for gaming, or experience real-time virtual reality, from wherever they happen to be.

Net neutrality dictates that ISPs cannot preferentially treat one stream of Internet traffic over another. To circumvent this, businesses that can afford it, purchase dedicated access facilities to the public Internet and to private internets, from unregulated telcos. This preferential connectivity provides businesses with enhanced performance when interacting with cloud-based Internet content or applications.

The white paper outlines how 5G can turn this situation on its head. It shows how 5G enables evolution to a situation where preferred access with service assurance is available to all fixed and mobile users, and on a dynamic, per-use basis. Consumers will be able to enjoy high-definition video, obtain lightning responses for gaming, or experience real-time virtual reality, from wherever they happen to be.

5G's mobile and multiservice nature makes this evolution feasible. It has all the ingredients in place for telcos to create a technically and economically viable business, where they assign connectivity resources dynamically – from a pool of shared resources – to specific end-user service requests.

Contact us for more information on the 5G revenue generating opportunity at rbbn.com

About Ribbon

Ribbon Communications (Nasdaq: RBBN), which recently merged with ECI Telecom Group, delivers global communications software and network solutions to service providers, enterprises and critical infrastructure sectors. We engage deeply with our customers, helping them modernize their networks for improved competitive positioning and business outcomes in today's smart, always-on and data-hungry world. Our innovative, end-to-end solutions portfolio delivers unparalleled scale, performance, and agility, including core to edge IP solutions, UCaaS/ CPaaS cloud offers, leading-edge software security and analytics tools, as well as packet and optical networking leveraging ECI's Elastic Network technology.