

COGENT COMMUNICATIONS

Comments on

BEREC Report on IP Interconnections practices in the Context of Net Neutrality

July 5th 2017

Cogent Communications is a multinational, Tier-1 facilities-based ISP, consistently ranked as one of the top five backbone networks in the world. Its network spans over 57k route miles, in 198 markets over 41 countries and 3 continents. It connects directly to over 5,940 ASN's and carries approximately 20% of Internet's world traffic.

[BEREC's guidelines.](#)

IP Interconnections are excluded in principle. Cogent recognizes that "With regard to IP interconnections BEREC's Guidelines clarified that the EU-Regulation 2015/2120 in its Art. 3 (3) concerns equal treatment of all traffic "when providing internet access service" and therefore excludes IP interconnection practices from its scope."

IP interconnection is indeed a very large market. It encompasses all methods of connections related to the exchange of IP packets, such as CDN, IEX, Direct Peering (free or paid) and Transit. It also includes an even wider range of actors, such as CDN providers, Peering exchanges, Content and Application Providers, Hosting companies, Managed Services as well as Transit and Access providers.

IP Interconnection practices can be taken into account nonetheless. Yet, as BEREC's report clearly demonstrates, IP Interconnection congestions only seem to become a gating factor where the internet connects to a limited number of large Access Networks.

Cogent therefore welcomes BEREC's acknowledgement "in its Guidelines on Net Neutrality that NRAs may take into account the interconnection policies and practices of ISPs in so far as they have the effect of limiting the exercise of end-user rights under Art.3(1) of the Regulation. This may be relevant e.g. if interconnection is implemented in a way which seeks to circumvent the Regulation."

However, despite the best of intentions, Cogent believes that BEREC's 2017 report takes wrong logical turns at various levels and generally lacks a global framework with which IP Interconnections practices need to be reviewed and analyzed. Cogent therefore cannot agree with the report's main findings and conclusions.

Competition was not enough

At various stages through the report¹, BEREC maintains that competition, market forces and a balance of bargaining powers were sufficient incentives to lead to the disappearance of congestions. Cogent cannot agree with this.

- A) In the USA, IP Interconnection issues were only resolved after the FCC Open Internet order. It took regulatory intervention and the FCC to clearly state that providing Broadband Access to end consumer implied the obligation to provide sufficient capacity at the IP Interconnection level.
- B) In Germany, it took regulatory oversight for DTAG to agree to a two year interconnection capacity increase with Cogent in 2009. After that two year period, which finished in 2011, all further increases were stopped and DTAG went back to its previous “no increase without payment” policy. It is still effective today and competition has not been able to resolve it. The internet is currently partitioned for those specific DTAG eyeball destinations.
- C) In France, legal actions in front of the Autorite de la Concurrence by Cogent resulted in a weak (and likely never enforced) internal and opaque settlement at Orange (between Open Transit and Orange), which did not ease congestions. If the situation has improved very recently since, it was certainly not the result of competitive forces that would ensure congestion free interconnections.
- D) In the Netherlands, UPC’s takeover of Ziggo resulted in degraded connectivity for Ziggo consumers. The Commission imposed a series of engagements which were insufficient to resolve market distortions. Those remained in place afterwards and if the situation has eased recently, it was certainly not the result of competitive forces that would ensure congestion free interconnections.

NRA’s and BEREC’s belief that competition has played a part in solving interconnection issues in Europe is based on the wrong assumption that an alternative transit connection options always exists. Specifically, in France and the Netherlands, authorities argued that it was possible to reach Orange’s and UPC/Ziggo’s end users by connecting either directly (and therefore by paying for increased capacity) or indirectly by purchasing “transit” from a party that would itself be paying to reach the desired destination (essentially a “paying peer”). The presence of a reseller (or paying-peer) is not a valid logical alternative option, as its offer relies on the same Access Networks’ technical and commercial monopoly.

In the above reasoning, BEREC is also being illogical. Clearly congestion disappears overnight when one party capitulates and agrees to pay for access. That capitulation, however, should not be interpreted as evidence that market forces have achieved the right result. If a monopolist can always point to a market clearing price, its existence does not constitute in itself evidence of a lack of abuse of monopoly power.

¹ Page 15 for example = “It turned out that even congestion of peering links carrying Netflix traffic that were congested for 18 hours a day **“vanishes essentially overnight”** when the involved parties concluded a new business agreement. It is also emphasized that congestion *“can come and go essentially overnight as a result of network reconfiguration and decisions by content providers as how to route content”*.^{41,42} ... and **“These findings generally support BEREC’s 2012 reasoning** that in those few instances where disputes occurred these were typically settled by the market mechanism” Or again on page 12: “Ultimately, this boils down to the question whether CAPs depend more on eyeball ISPs or vice versa or in other words, who derives higher benefits from a peering relation.”

BEREC should first start by deciding what the right result should be and then compare reality to that desired outcome. When it comes to Internet's existence, it does matter who pays who... let us remind ourselves and BEREC why.

Universal Reachability and Connectivity

Reachability precedes traffic. It is a truism to say that reachability is a pre-condition to traffic. Simply said, in order to send traffic to any destination, the sender needs to "see" the IP address (or rather the prefix to which it belongs) of the potential receiver in the nearest router's internet tables. Prefixes are propagated from their "home" network to Internet's other 56,000 networks and traffic flows back from those networks, following the directions embodied in the propagated prefixes. Universal Connectivity is a consequence of Universal Reachability...

Universal Reachability is the cornerstone of the internet. To achieve it, each internet actor takes appropriate and **voluntary** steps to make **its own IP addresses** visible and reachable by all others.

Transit and Peering are the only two possible ways to propagate prefixes. Peering propagates prefixes to the clients (direct and indirect) of the two peered networks, while Transit propagates prefixes to the clients (direct and indirect) *and peers* (and their direct and indirect clients) of the transit network. A transit relationship is always asymmetrical with the transit provider offering the full internet routing tables and bearing the costs of the network to support it.

This propagation to peers has a multiplier effect, is unique to transit, is the engine of universal reachability, and is the only reason that transit can deliver universal, ubiquitous connectivity with a single connection. By contrast, Peering is a one-to-one relationship that only delivers connectivity to a subset of the internet. Universal Connectivity through peering-only can be achieved as well, but would require peering connections with all other Tier1 providers. It is impractical for most companies to maintain this large number of peering connections.

At the top of Internet's "pyramidal structure" are a few Tier1 Transit Providers that achieve universal connectivity by peering between themselves. This structure emerged spontaneously from basic economics. A Transit provider will propagate its clients' prefixes widely (to clients and peers) in order to attract as much traffic as possible and generate more revenue from its client as a result. A peer will only propagate its peer's prefixes to its own clients, because he receives no money from the peer, but only from its clients. Transit networks follow economic principles: they only propagate prefixes and carry traffic if they get paid at least by one of the two, origin or destination parties. A peer will never propagate its peer's prefixes to another peer, because this would result in network and traffic loads (i.e., costs) that would not be paid for by any of the two peers.

Change the payment system and we are back to POTS.

It logically follows that, a termination tax paid to an Access Network restricts that Access Network prefix propagation to the clients of the "paying-party" and artificially raises the costs of providing connectivity to that specific destination. The upstream "paying-party" will only show those prefixes to its clients. Indeed, if those prefixes were propagated to its peers, the "paying-party" would be generating negative margins, squeezed between no revenue on one side (with the peer) and a termination payment on the other (with the Access network).

With a termination tax, the Internet can no longer be defined by universal, ubiquitous connectivity through a single connection. It becomes a series of parallel lanes or silos dedicated to specific destinations. Content Providers will only reach specific Access Networks by buying transit from the few providers / resellers / “paying parties” pre-selected by those Access Networks, unless they connect directly to the Access Network for a fee.

The Internet would be reduced to POTS (Plain Old Telephone System), where specific routes and prices would need to be negotiated to reach specific destinations. This is already reality with DTAG in Germany². With a termination tax, Internet’s global reachability and connectivity for a single price and with a single connection would simply cease.

BEREC remembered the dangers of allowing Access networks to use deliberately congested IP Interconnections and force a reversal of payment flows at the gates of their technical monopoly. Indeed, BEREC³, OECD⁴ and the EU Parliament⁵ have already warned against such abuses in the past. **It is therefore surprising that this latest 2017 report takes such a benign view of the same reality.**

Traffic Ratios and Pull/Push asymmetry

BEREC appears also to recognize traffic asymmetry as a valid reason for disputes.

Internet traffic is clearly asymmetric. Traffic is composed of download requests by end users and responses to those requests by content providers. Essentially, Internet traffic is PULLED by end-users, not pushed by content providers. End users are buying an Internet connection because they want to receive those downloads. It is part of their subscription contract but it is *also intrinsic to their Internet usage right*⁶. The fact that traffic download is large and increasing is only a testament of Internet’s success at adding value to the consumer and at creating new or displacing older antiquated business models. Because they have more Pull (download) than Push (upload) traffic, Access Networks are also designed to technically deal with such asymmetry.

² See Hetzner Online comment on Double Payment concerning DTAG destinations at https://wiki.hetzner.de/index.php/Double_Paid_Traffic/en

³ BEREC : *estime qu' "accroître la visibilité" de certains modèles que les opérateurs historiques souhaiteraient promouvoir "est inapproprié et pourrait être préjudiciable à la poursuite du développement de l'Internet, cette proposition présentant un réel potentiel d'atteinte aux consommateurs et aux fournisseurs d'applications et de contenu (les "FACs"), de perturber l'accès au contenu et de contribuer à un agrandissement* http://berec.europa.eu/files/document_register_store/2012/11/BoR_%2812%29_120_BEREC_on_ITR.pdf

⁴ *"This model appears to resurrect the legacy pricing methods of the past and to apply them to the Internet. In addition to raising costs for all interconnecting networks and their users, it would deprive the Internet of the ability to pursue the kind of evolution and discovery of new models discussed elsewhere in this report. Providing adequate investment for new networks is a worthwhile objective, but those networks should have to earn their revenue by providing value businesses, consumers, or interconnecting networks are willing to pay for. Governments should not support this approach, and they should prevent any collusive action to impose such a system".* [OECD Digital Economy Papers No. 207](#)

⁵ *European Parlement "s'inquiète de ce que ces propositions de réforme de l'UIT prévoient la mise en place de nouveaux mécanismes d'enrichissement qui pourraient menacer gravement le caractère ouvert et compétitif de l'internet en faisant grimper les prix, en entravant l'innovation et en limitant les accès; rappelle que l'internet doit rester un domaine de liberté et d'ouverture"* <http://www.europarl.europa.eu/sides/getDoc.do?type=MOTION&reference=P7-RC-2012-0498&language=fr>.

⁶ [Art 3.1 of Regulation 2120/2015](#)

Each end user's surfing behavior determines his/her own traffic ratio. Access Networks' overall ratios with the rest of the Internet, are only a reflection of their end users net aggregated traffic pattern. Asymmetric ratios are simply endemic to the access business.

"NRAs may take into account the interconnection policies and practices of ISPs in so far as they have the effect of **limiting the exercise of end-user rights** under Art.3 (1) of the Regulation."

Does it not follow logically that refusals by Access Networks to upgrade interconnections under the pretense of asymmetric ratios negates their contractual obligations to their end users and is *de facto* limiting the exercise of end-user rights? Cogent certainly believes so.

For completeness, balanced ratios can exist, but mainly *between operators of the same kind*, i.e., between Access Networks or between Transit providers. Peering policies that include ratios work between transit providers because their networks are both "avoidable" and *network loads* (i.e., traffic x distance travelled) can be adjusted across multiple interconnection points (using 'cold', instead of 'hot' potato routing). By contrast, Access Networks are unavoidable termination monopolies. They cannot be by-passed as their end-users are "single-homed". Providers are already delivering the requested traffic on Access Networks doorsteps, meaning that the potato is always cold and traffic ratio arguments are both nonsensical and irrelevant.

Competition should be strengthened

If Transit is the only true ubiquitous system, it does not make it a "one size fits all" solution.

Direct peering, Content Delivery Networks (CDN's) and Internet Exchange participations (IEX) offer connectivity to various "subsets" of the internet. They are used concurrently and in competition with transit. They each have their own merits, in terms of reach, commercial conditions or business models.

Specifically, local traffic (between Access Networks or between locally hosted content and Access Networks) can benefit from better quality (faster routes, traversing fewer networks with less latency) and costs. With the transit intermediary out of the picture, private peering, and IEX's or CDN's cost savings should be significant. A new equilibrium, cheaper than the sum of transit costs should most likely be found.

However, networks cannot be forced to peer or connect to an IEX or a CDN at any conditions. In fact, some Internet actors are refusing to peer and/or demanding extortionate connection fees. The fact that cost per bit in the wholesale market has fallen 8x faster than in access markets should strengthen the view that access market conditions provides less incentive than in wholesale to pass technological advances savings onto consumers⁷.

In those conditions, transit is no longer "just another connectivity method". It becomes the ultimate competition guarantor and the pricing gauge to which other solutions need to be compared. Its existence as an effective alternative route ensures that commercial conditions for all other connectivity methods (e.g. CDN's) remain in check with technological advances. Because transit exists, direct peering, IEX or CDN commercial conditions have to be beneficial to both parties, not just to the one with the bigger bargaining power.

⁷ Cogent's internal research.

BEREC rightly points out “in its 2012 report that the costs of delivering traffic on a per unit basis were subject to continuous declines which was due to competitive pressure as well as technological progress”. BEREC cannot influence the speed of technological advances, but if it want to ensure continuous price declines through competition, it has to ensure that transit remains a valid, effective, non-congested and as direct as possible alternative route option to end users.

BEREC also says that: “it sees no indications that this general trend has either stopped or even reversed” (page 8). Cogent is surprised but such statement. Market participants have revealed publicly that the costs of delivering traffic to DTAG for example has risen by 30% last year alone, and that DTAG was only able to increase pricing because it had successfully managed to congest IP Interconnections and suppress transit as a valid alternative connectivity option.

If competition and market forces have not achieved the right result (see above), it is precisely because BEREC and NRA's have, by weakening interconnection rights, failed to recognize and preserve Transit as a competitive weapon.

Economic Independence and Transit

Transit is a competitive market because bandwidth is a commodity. It is graced with constant price declines only because of transit's ubiquitous connectivity. All economic actors can freely and **independently** select their Internet providers, without worrying about losing connectivity to any specific destinations.

This **independence** is only achieved because Access Networks prefixes are propagated universally through a transit connection or through multiple peering connections to all Tier1 providers. This allowed transit players to bring down transit prices for the greater benefits of end users and content creators alike.

Peering to a selected few (as opposed to all Tier1) providers creates **co-dependencies**. Access Networks 'choice of “paying-peers” determines that of traffic senders. If Access Networks do not buy transit, content providers have to connect to the providers/resellers/paying-parties that have been pre-selected by the Access Networks or otherwise pay for direct peering with them. Without a proper alternative connectivity option, commercial conditions reflect bargaining powers.

Large content players will counterweight large Access Networks in private agreements. But smaller players will be crowded out as they lose the benefits of ubiquitous connectivity. New and innovative business models depend on a securing a simple, easy to manage and cheap digital distribution channel. The ability to reach all Internet end points with one click delivers enormous economies of scale and provides a very low entry barrier to innovation and creativity. Without the default Transit option, every new venture would need to buy Transit, at different prices and from different providers in order to achieve the same customer reach. A return to POTS would be a massive step backwards for economic value creation.

To maintain the integrity of the transit alternative route, economic actors' independence and internet's universal reachability, BEREC should recognize that Access Networks must either buy transit or peer simultaneously with all Tier1's, with enough bandwidth capacity to allow traffic to flow uncongested to its final consumer destination.

The FCC got it “just right” and BERC should emulate them.

FCC’s Open Internet order has got it just right when it states that:

(204) - Broadband Internet access service involves the exchange of traffic between a last-mile broadband provider and connecting networks. The representation to retail customers that they will be able to reach “all or substantially all Internet endpoints” necessarily includes the promise to make the interconnection arrangements necessary to allow that access. As a telecommunications service, broadband Internet access service implicitly includes an assertion that the broadband provider will make just and reasonable efforts to transmit and deliver its customers’ traffic to and from “all or substantially all Internet endpoints” under sections 201 and 202 of the Act

FCC position recognizes that traffic is pulled by consumers and that the procurement of internet services to consumers includes naturally the obligation to procure uncongested connectivity to and from the Internet. American ISP can no longer refuse to upgrade IP Interconnection points and/or demand payments in exchange. As a result, the few months that followed FCC Open Internet order, witnesses the rapid disappearance of congestions and the signing of many peering agreements between major Access and Transit networks.

Cogent believe BERC should emulate FCC’s position and clearly state that “when taking into account the interconnection policies and practices of ISP’s in so far as they have the effect of limiting the exercise of end-user rights” NRA’s will take account of the fact that:

When providing Internet access services and to respect end users’ right to use the Internet, Access Networks have an affirmative obligation to deliver global reachability and ubiquitous connectivity, that allows traffic to flow (a) uncongested, (b) without unnecessary delays and (c) to and from all Internet endpoints.
