

## Liberty Global Peering Principles

Liberty Global B.V. and affiliates in its group (together 'Liberty Global') strive to provide excellent internet access to all of its customers. To accomplish this, Liberty Global uses these Peering Principles as guidance on the technical and operational requirements for potential peering partners.

IP interconnection is the interconnection of administratively separate internet networks for the purpose of exchanging traffic between the customers of each network. Peering is here defined as a form of IP interconnection where each party bears its own costs. Other IP interconnect products are available from Liberty Global ([link](#)). For those that do not wish to enter into a peering or other IP interconnection relationship with Liberty Global, access to Liberty Global IP networks is also available via third parties.

These Peering Principles cover technical and operational requirements for the exchange of traffic between administratively separate networks only and expressly do not pertain matters relating to real estate, such as rack space or power, or other elements unrelated to the definition of peering as set out above.

Notwithstanding the sections in the below, under **Minimum Requirements**, regarding the geographical locations of venues for interconnection, Liberty Global is generally agnostic as regards the ownership of venues where it exchanges traffic with its peers.

Liberty Global needs a rationale to enter into a peering relationship, which means it will only do so where this is to the mutual benefit of it and the potential peering partner. Therefore, Liberty Global will only establish peering when this has the potential to improve the quality of experience of its internet customers.

This document, Liberty Global's Peering Principles, is not a peering agreement in itself. No contractual nor any other rights or any formal offer shall be inferred or arise out of this document. Liberty Global cannot be obliged to enter into negotiations based on this statement, nor does any liability arise out of this document. Peering relationships with Liberty Global will only be established on the basis of a formal contract.

### Minimum Requirements

Liberty Global identified cumulative general minimum requirements the potential peering partner shall meet. On top of this additional requirements apply for the following types of peering:

- **Global Peering** (traffic exchange with all Liberty Global footprints);
- **Regional Peering** (traffic exchange with a single Liberty Global footprint);
- **Localized Peering** (traffic exchange at multiple, localized interconnection points within a single Liberty Global footprint).

In order for a request for peering to be considered by Liberty Global the potential peering partner shall meet the following general criteria:

- Operate a redundant international backbone network, in which the majority of inter-hub connectivity shall have a capacity of at least 100 Gbps.
- Actively cooperate to achieve a balanced benefit and investment contribution to ensure that the relationship is and continues to be in the mutual interests of the parties.

- Interconnect only using direct (10 or 100) gigabit Ethernet or future more cost effective technologies.
- For **Global Peering**, the potential peering partner shall meet the following additional cumulative criteria:
  - Shall have a European footprint with presence in five countries and able to interconnect to Liberty Global in at least three locations inside Europe *or* must have a non-European footprint and able to interconnect to Liberty Global in at least two locations outside Europe.
  - Shall exchange a minimum 95<sup>th</sup> percentile of 7 Gbps inbound or outbound traffic with Liberty Global's AS6830 network with traffic ratio between 95<sup>th</sup> percentile inbound and 95<sup>th</sup> percentile outbound between 1:3 and 3:1.
- For **Regional Peering**, the potential peering partner shall meet the following additional cumulative criteria:
  - Shall be able to interconnect resiliently to Liberty Global in at least two, or three in case of the United Kingdom, locations in the country concerned, of which the majority of locations will be at the sole discretion of Liberty Global.
  - Shall exchange a minimum 95<sup>th</sup> percentile of 140 Gbps inbound or outbound traffic with Liberty Global network(s) in that specific country.
- For **Localized Peering**, the potential peering partner shall meet the following additional cumulative criteria:
  - Shall be able to interconnect to Liberty Global at an economically viable number of locations, comprising at least three, or six in the case of the United Kingdom, locations in each country concerned. All such locations will be at the sole discretion of Liberty Global.
  - Shall exchange a minimum 95<sup>th</sup> percentile of 70 Gbps inbound peak bandwidth or outbound traffic with Liberty Global network(s) with a long-term (> 1 year) 95<sup>th</sup> percentile peak to 95<sup>th</sup> percentile average ratio below 3:1, for each localized interconnection in that specific country.
  - Shall provide resilient back-up and overflow path in the form of **Regional Peering** or **Global Peering**, as described above.
  - Shall subscribe to the additional conditions set out below, under **Additional Considerations on Localized Peering**.

In the requirements under these Peering Principles, a measurement of 95<sup>th</sup> percentile is defined as sampling every 5 minutes the bits transferred, during a calendar month, ignoring the top 5% values and then taking the highest remaining value.

If a potential peering partner does not fulfil these requirements, Liberty Global may nevertheless consider peering on the basis of other commercial and technical arrangements, at the sole discretion of Liberty Global.

## Technical and Operational Requirements

All potential peering partners are required to:

- Operate a professionally managed 24x7 NOC and provide Liberty Global with all contact details concerning this NOC.
- Ensure good communication regarding network maintenance with regard to the traffic exchange, agree to actively cooperate to resolve security incidents and other operational problems and in principle follow the practices outlined in BCP38 and BCP46 ([link](#)).
- Refrain from activities which will undermine the peering relationship including but not limited to: pointing a default route or otherwise forwarding traffic for destinations not explicitly advertised, resetting BGP next-hop, selling or giving next hop to others.
- Participate in capacity reviews at least twice a year and aim for timely expansion and upgrading interconnect infrastructure where required and mutually beneficial, agree to review upgrades of individual interconnects when 70% peak utilization is reached and agree to exchange a maximum of 1 Gbps per location, where peering is established over a public internet exchange.

## Requesting Peering with Liberty Global

To request peering with Liberty Global, a potential peering partner shall send a written peering application to [peering@aorta.net](mailto:peering@aorta.net). This application shall provide:

- A description of the potential peering partner's network; geographic scope, backbone capacities and type of traffic, including expected initial traffic volumes exchanged, as well as a one year forecast.
- The desired technical and commercial type of relation requested, including reference(s) to peering DB ([link](#)), or exhaustively list all of the exchange points and facilities where the potential peering partner has the ability and desire to interconnect with Liberty Global.
- Confirm agreement to relevant minimum as well technical & operational requirements outlined in sections above.

Potential peering partners providing all information requested above will be contacted within 1 calendar month to further discuss their requests. Note that Liberty Global:

- Evaluates requests based upon actual long term observed traffic and will not setup trial peering.
- Requires an NDA before formal discussion of a peering agreement can begin.
- Requires a formal contract for any new peering agreement.

## Additional Considerations on Localized Peering

For the purposes of these Peering Principles, caches are defined as software or hardware components storing data and serving traffic, which are – irrespective of their geographical location – located logically within Liberty Global's networks (AS internal). Similar solutions, such as those provided by third party Content Distribution Networks (CDNs), which store data and serve traffic – irrespective of their geographical location – from logically outside Liberty Global's networks (AS external) are not considered caches.

With the exception of some legacy instances, Liberty Global does not allow content providers or other third parties to deploy caches. As a result, all third party content, applications and services will have to be served from AS external platforms.

Localized Peering is defined, for the purposes of these principles, as a form of IP Interconnection aimed at facilitating edge-computing, edge-caching, or similar or affiliated (future) technologies and business models. To ensure geographical proximity to the end-user facing network edge, Localized Peering relies on multiple, more localized points of interconnection than Global Peering and Regional Peering, or than is customary in current industry practices on peering.

With a view to acting transparently and even-handedly in supporting emerging technologies and business models, Liberty Global is willing to consider Localized Peering at a minimum number of locations in any given country, subject to the minimum requirements set out above and subject to the following additional conditions:

- Any edge-computing or edge-caching solution, regardless of its physical or geographical location, shall be logically located on a separate AS, not within any Liberty Global network (AS external).
- Any existing agreement between Liberty Global and its peering partners does not confer upon Liberty Global the obligation to explore Localized Peering options with that partner. Liberty Global will seek to act even-handedly and treat all current and potential (peering) partners on similar terms as regards potential instances of Localized Peering.
- Any agreement between a (potential) peering partner and Liberty Global, unrelated to peering, does not confer upon that (potential) partner an expectation that Liberty Global will consider Localized Peering. In particular those agreements concerning content rights, real estate (including lease) or access to passive or active network infrastructure, or any other domain unrelated to peering, shall have no bearing on Liberty Global's decision to peer.

### **General Information**

Periodic review of this statement of principles will be conducted by Liberty Global to ensure that the eligibility requirements are consistent with Liberty Global's business needs. Liberty Global may amend this document at any time.

### **Effective Date**

These Peering Principles take effect from December 1<sup>st</sup>, 2020 onwards. We seek to apply these principles to all new peering relationships established after that date and, to the extent reasonable, to changes to existing peering relationships.

In recognition of the fact that Liberty Global has a considerable number of legacy arrangements, dating back to well before the adoption of the current Peering Principles, Liberty Global does not generally seek to apply these Peering Principles retroactively, if the peering relationships concerned have not changed over time. In case of operational necessity, for example as a result of the merger of previously separate Autonomous Systems or a change to or termination of our physical presence at a particular location, a different approach may however be followed.