

# INTERNET PEERING WITH EXAWARE

In partnership with



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Internet Peering is a critical part of every Telecom Network. It provides the much-needed connection to the internet and ensures access to global content for all customers on the Network.

In this document, we are explaining the different configurations for an Internet Peering and how Exaware stands out in this application.

## INTERNET PEERING: HOW IT WORKS

Every Telecom Network needs to provide a connection to the internet, for the benefit of its end users. This connection, in its most basic form, is made possible through the direct access to a large Telecom Carrier, whose network is connected to all of the other networks. This is called Internet transit.

This type of connection is suitable to small networks which cannot afford to deploy their own internet access, but it will come at a significant charge, based on the amount of bandwidth required.

For medium size and large networks, it is recommended to combine both internet transit and internet peering. The latter is usually not charged by the other operators, as the traffic flows both ways and therefore there are mutual interests to establish a peering.

It will only require the setup of a connection to a peering point, with a router that can handle large amounts of traffic and with the right feature sets.

Although the setup of a peering point will require a reasonable financial investment in the beginning, this will be largely offset by the substantial savings.

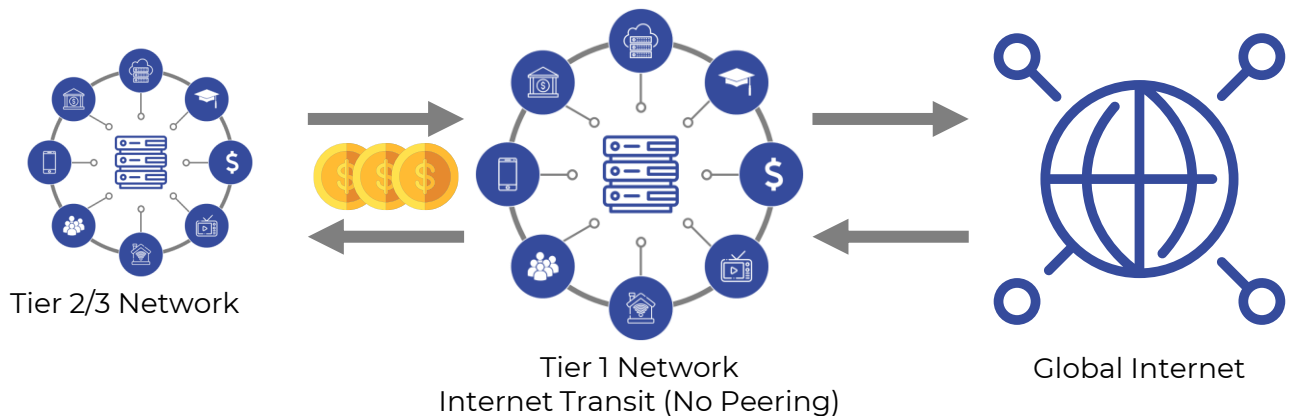
There are multiple configurations for a peering, each suited to the needs of the Network.

# INTERNET TRANSIT ONLY

In this configuration, The Telecom Network accesses the internet only through a transit provider, which has peering connections around the world and ensures a global connectivity with performance commitments.

Though this solution is fast and relatively simple to implement, it will prove costly in the medium term, as the bandwidth demand is growing.

It provides also less flexibility on how the Telecom Network is seen and reached from the internet.



# PEERING THROUGH IXP

Peering through an Internet eXchange Point (IXP) is the most common form of peering found nowadays.

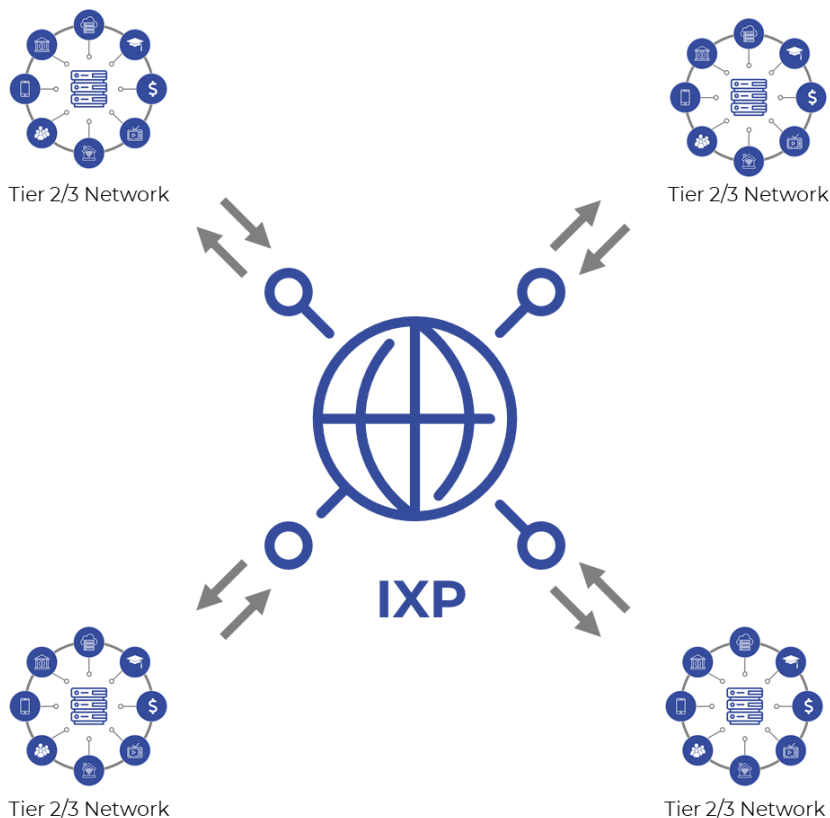
IXPs are organizations which enable the public connection between 2 or multiple networks, in order to allow the free exchange of traffic between the 2 networks.

An IXP will typically host most or all of the local Telecom Networks of the country, enabling them to connect directly.

Peering will require a robust router, with enough bandwidth capacity, and the necessary features, principally related to the BGP routing protocol.

The IXP will charge a reasonable annual fee for the hosting, but the peering connections will be free of charge.

This enables a massive savings compared with an internet transit connection.



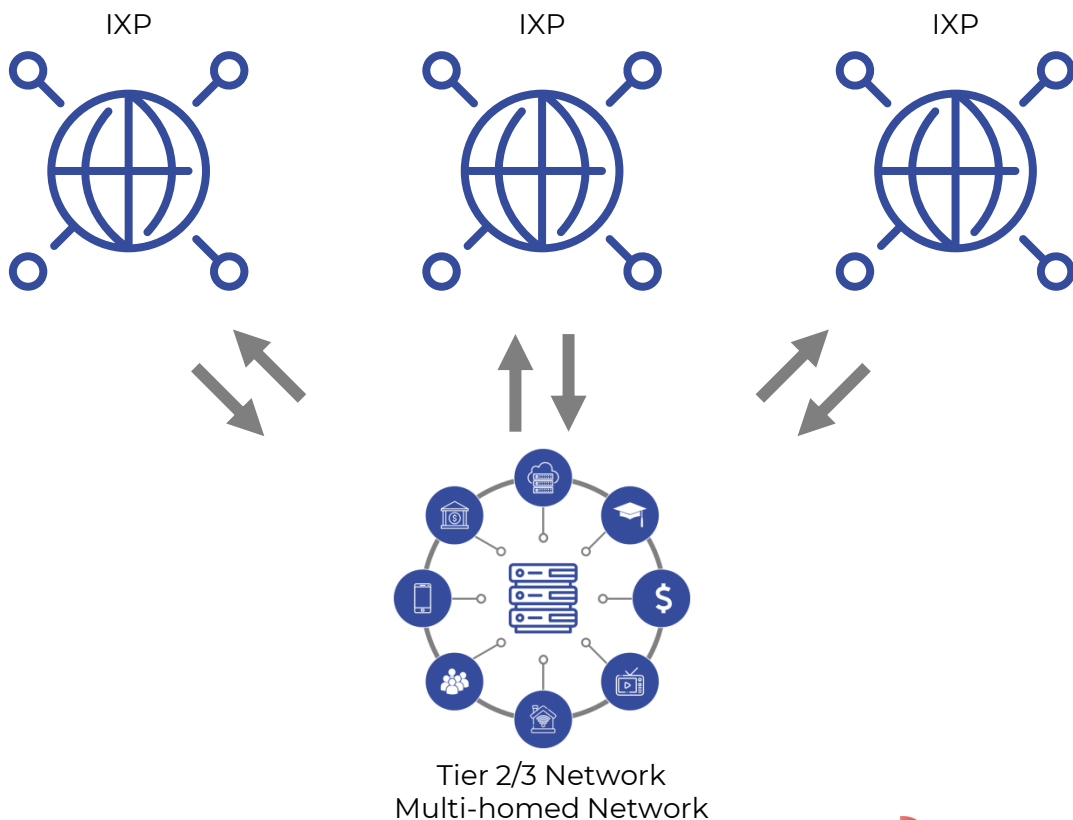
# MULTI-HOMED NETWORK

For advanced Telecom Networks, the deployment of peering connections through multiple IXP is common.

The choice of IXP and partner network to peer with is based on a detailed analysis of the origin and destination of the traffic coming in and out of the Telecom Network.

This allows to identify which top 5 networks constitute most of the traffic, in order to remove this traffic from the costly internet transit and exchange it for free through peering.

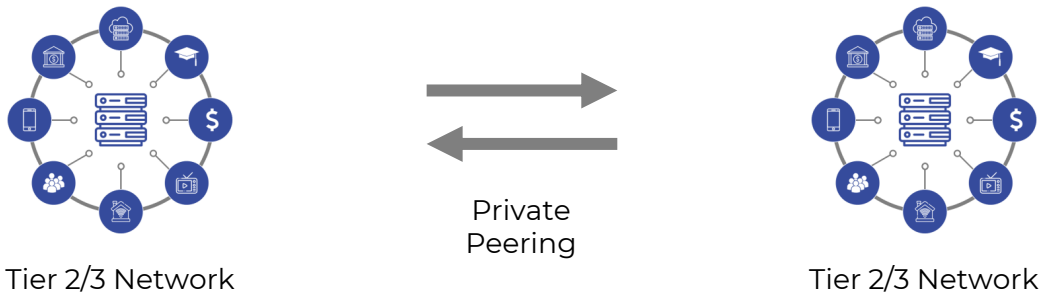
Routing the traffic in this configuration requires a lot more work, to ensure an optimal performance and a balance in the amount of traffic sent. The router plays a critical role in this and will involve advanced BGP features to control the routing of the incoming traffic.



# PRIVATE PEERING

When 2 networks identify that they exchange significant traffic, they can decide to establish a private peering.

A private peering does not involve the IXP and is set by the 2 Networks



## PEERING SOLUTIONS WITH EXAWARE

Exaware provides a complete set of peering solutions for all of the above-mentioned cases. We work closely with our Hardware partners to provide both the features and the capacity required by large networks.

Why does it make sense to use disaggregated routing solutions for internet peering? Because internet peering is a critical component of every telecom network, connecting its users with the global world, which has a significant impact on the overall costs of the network and routing equipment is part of it.

Having a strong Hardware equipment, powered by a robust and scalable software Operating System is key to ensure a fully working internet peering.

While historical equipment manufacturers will require you to buy high-end, expensive routers, in order to have the necessary hardware components required for peering, disaggregation comes to fix this issue and provide entry-level routers, with the capability to hold peering traffic at scale.

## Routing Performance

The performance of a routing solution is mainly driven by 2 factors:

- The performance of the hardware
- The architecture of the Software Operating System

Exaware works with multiple hardware manufacturers, who use the same family set of DNX chipsets from Broadcom (Qumran MX and Jericho 2/2C).

The major performance differences are found in the quantity and the type of memory used. With Exaware, you have access to a broad choice of hardware, which covers various needs and certainly the most demanding peering applications. Typically, peering requires external TCAM Memory, allowing to perform fast search in millions of entries for instant routing decisions.

All of the Hardware equipment have internet scale and reliability through external TCAM, high end CPU and redundant power supply and fans.

### Non-Redundant "Pizzabox"



#### N-R Peering, Edge, Core

800G, 2.4T (Q-MX/2C)  
4T (Jericho2)

800G to 4T

### Redundant Back-to-back

Active/Standby solution for  
mid-size bandwidth.

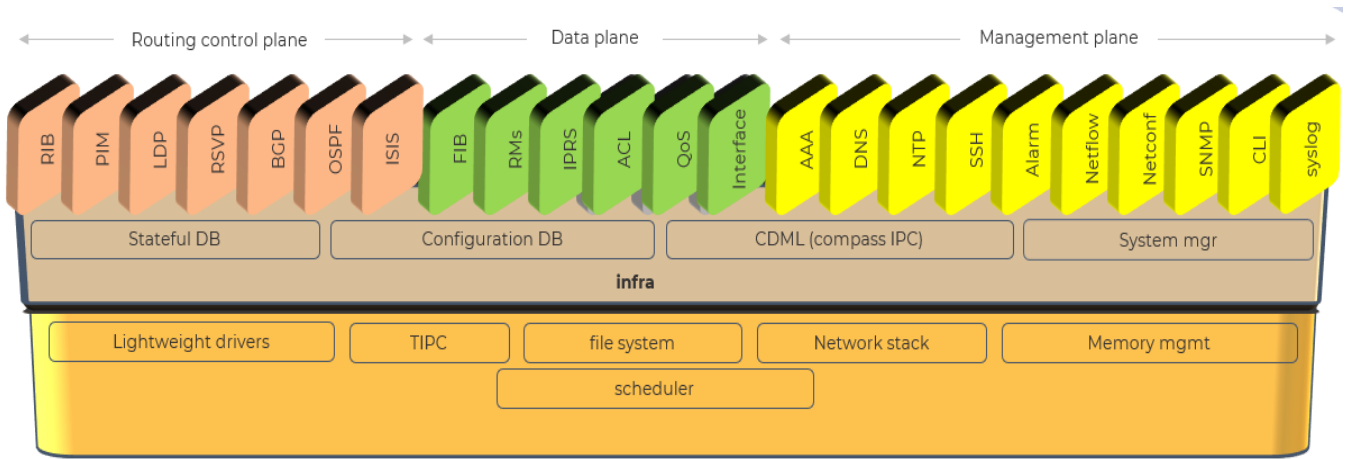
Jericho/Jericho2C/2C+



#### Aggregation, Edge, Redundant Peering

600G to 8T

Our software Operating System was built from the ground up with performance and scalability in mind. Originally designed to operate on chassis-based hardware, ExaNOS has a distributed architecture, allowing to run separate processes with their dedicated memory and CPU resources, in order to take full advantage of the underlying hardware.



**EXANOS ARCHITECTURE**

Here are performance indicators of EXANOS Routing Solution for the EdgeCore MX equipment.

Feature	Value
Max Number of IPv4	2.9 million
Typical insertion time	135 seconds
Number of prefixes per second	21,600
BGP Path Scale	20 million
BGP Peers	Tens of full BGP table adjacencies
FIB Scale	2.7 million IPv4 routes



ExaNOS feature set goes way beyond peering applications, and has many features required to set up and manage your internet traffic as required, whether in a single-homed or a multi-homed network.

All these features are included in the standard version of ExaNOS and come at no additional charge

<p style="text-align: center;"><b>Routing Protocols</b></p> <ul style="list-style-type: none"> <li>▪ IPv4, IPv6 Dual stack</li> <li>▪ eBGP, iBGP at scale</li> <li>▪ MP-BGP</li> <li>▪ BGP signaling for L3VPN</li> <li>▪ BGP signaling for L2VPN</li> <li>▪ 6PE and 6VPE</li> <li>▪ Label Unicast</li> <li>▪ OSPFv2, V3</li> <li>▪ IS-IS – IPv4/IPv6, Multi topology</li> <li>▪ Route distribution across protocols</li> <li>▪ PIM-SSM/ASM</li> <li>▪ IGMPv2/IGMPv3</li> <li>▪ RSVP-TE</li> <li>▪ LDP</li> <li>▪ IGP shortcut</li> <li>▪ OSPF-TE</li> <li>▪ ISIS-TE</li> <li>▪ L3VPN</li> <li>▪ Inter-AS L3VPN</li> <li>▪ VPWS</li> <li>▪ VPLS</li> <li>▪ Internet Access</li> <li>▪ BFD for all protocols</li> <li>▪ NH Tracking</li> </ul>	<p style="text-align: center;"><b>Management</b></p> <ul style="list-style-type: none"> <li>▪ Hierarchical, Commit based CLI</li> <li>▪ Netconf</li> <li>▪ SSH</li> <li>▪ Telnet</li> <li>▪ Out-of-band and in band management</li> <li>▪ SNMPv2/V3</li> <li>▪ RBAC</li> <li>▪ AAA/TACACS+</li> <li>▪ NTP</li> <li>▪ Syslog</li> <li>▪ Rich, Hierarchical Policy Language</li> <li>▪ Enhanced logging</li> </ul>
<p style="text-align: center;"><b>Data Path</b></p> <ul style="list-style-type: none"> <li>▪ VLAN</li> <li>▪ QinQ for all services</li> <li>▪ LAG</li> <li>▪ MPLS FRR</li> <li>▪ IP-LFA</li> <li>▪ Hierarchical FIB</li> <li>▪ BGP-PIC Core/Edge</li> <li>▪ Two level load-balancing</li> <li>▪ VRF at scale</li> <li>▪ DHCP Relay</li> </ul>	<p style="text-align: center;"><b>QoS &amp; Policy</b></p> <ul style="list-style-type: none"> <li>▪ Hierarchical Shaping</li> <li>▪ PORT/VLAN rate control</li> <li>▪ 2-rate/3-colors policers</li> <li>▪ MEF hierarchical policers</li> <li>▪ WRED</li> <li>▪ Weighted and strict priority queues</li> <li>▪ Minimum latency queues</li> <li>▪ 8 Queues per port/VLAN</li> </ul>
<p style="text-align: center;"><b>High Availability</b></p> <ul style="list-style-type: none"> <li>▪ Process restart</li> <li>▪ Graceful restart for all routing protocols</li> </ul>	<p style="text-align: center;"><b>Security</b></p> <ul style="list-style-type: none"> <li>▪ Data Path ACL</li> <li>▪ Control Plane ACL</li> <li>▪ Management VRF Separation</li> <li>▪ HW policing for CPU traffic</li> <li>▪ MD5 for routing protocols</li> </ul>
	<p style="text-align: center;"><b>Infra</b></p> <ul style="list-style-type: none"> <li>▪ Infrastructure</li> <li>▪ ONIE</li> <li>▪ Standard ONL</li> <li>▪ OpenBMC</li> </ul>

Our solution for medium size peering points is based on a 800G throughput configuration, with redundant fans and power supply.

Product Specs	Features supported
Qumran MX ASIC Based Platform	L2/L3 VPN, VPLS, H-QoS, v4/v6/MPLS
800 Gbps throughput	BGP/OSPF/ISIS/MPLS
48 x 10G SFP+ Ports	BGP Policy configuration
6 x 100G QSFP28 Ports	Fast Re-Route (FRR) – MPLS and IP
External TCAM	Next-hop tracking
Hierarchical FIB convergence - BGP-PIC	BFD for all protocols



**800G**



For large size peering points, which require full redundancy, Exaware provides capacities ranging from 2.4T and up to 8T, in back to back configuration, by connecting 2 boxes together.

Product Specs	Features supported
Jericho 2C ASIC Based Platform	L2/L3 VPN, VPLS, H-QoS, v4/v6/MPLS
2.4T throughput	BGP/OSPF/ISIS/MPLS
4 x 10G SFP+ Ports	BGP Policy configuration
48 x 25G SFP28 Ports	Fast Re-Route (FRR) – MPLS and IP
External TCAM	Next-hop tracking
Hierarchical FIB convergence - BGP-PIC	BFD for all protocols



**2.4T – 4T – 8T**

## Major Cost Savings

The transition to white box routing comes also with financial benefits, that of significant cost savings, so you can grow your internet connectivity while keeping your costs under control. This does not come at the price of routing stability or quality of customer support, as we know that having a network that operates 24/7 is critical to your business.

The savings are categorized as follows:

- Lower cost per bit
- Lower Operational cost in comparison to traditional routers
- Lower Initial investment cost in comparison to traditional router vendors
- No lock-in with Optics
- Easy and affordable expansion

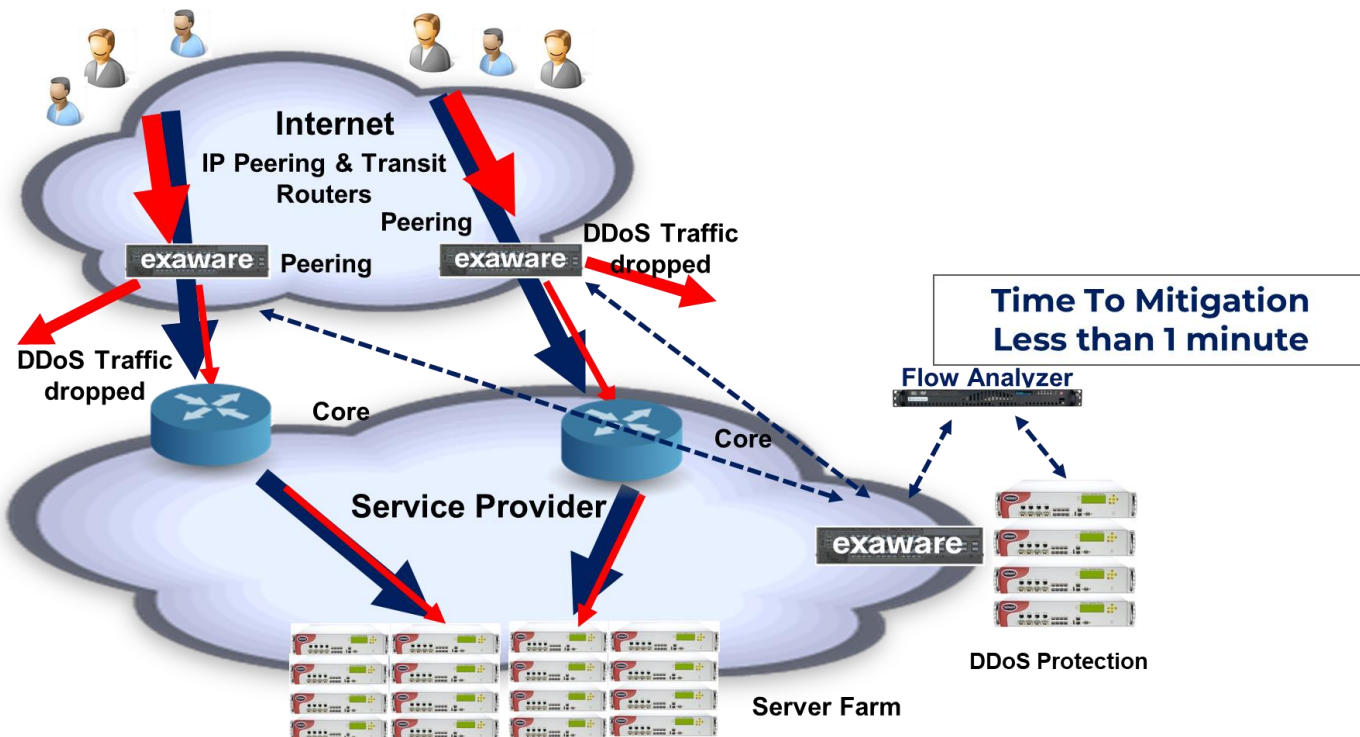
Contact us for a personalized analysis of your situation and the potential savings you could gain by moving to Exaware Routing.

## DDoS Mitigation with Exaware

DDoS attacks have a devastating impact on business operations, often time shutting down activities for a prolonged period of time. Exaware provides the capability to filter DDoS attacks at the peering point, in real-time, automatically and at scale.

ExaDOS connects with your existing DDoS mitigation platform to identify the source of attacks and apply the necessary filters to stop the attacks. With ExaDOS you can block, throttle or rate-limit the traffic from specific IP addresses, at the peering point. So you keep the unnecessary traffic out of your network and allow your users to continue their normal activities.

With ExaDOS DDoS filtering, you can provide your customers with a dedicated DDoS protection service, for their specific IP destinations. Contact us for more details.



# SUMMARY

Exaware provides you with a full set of solutions for your peering needs, both redundant and non-redundant configurations.

We support different hardware platforms from multiple vendors, to give you more choice and the flexibility to customize your network to your needs.

ExaNOS is the result of a decade of development, one of the few NOS with extensive experience in production networks of Tier-1 carriers.

# CONTACT US



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