STRATEGIC VISION PAPER

HOW PEERING SERVICES HELP TO OPTIMIZE AND STREAMLINE CONNECTIONS TO CLOUD PROVIDERS?

INCLUDE KEY SURVEY RESULTS – HOW FRENCH DECISION-MAKERS SEE PEERING SERVICES AS A SOLUTION TO OPTIMIZE THEIR CONNECTIONS TO CLOUD PROVIDERS?

TABLE OF CONTENTS

"MOVE TO CLOUD" REALITY

Cloud usage is not any more an epiphenomenon. Today, Cloud drives digital platforms, is key for remote work and education, supports business resiliency, computes AI and ML algorithms...

The Covid-19 pandemic has, in many cases, forced IT departments to turn to Cloud as an easily accessible infrastructure that can support a greater number of remote workers. According to the Vanson Bourne's Enterprise Cloud Index France, 47% of French companies invested more in hybrid and multi-Cloud as part of new investments directly related to the Covid-19.

Among major Cloud trends, AdVaes notes increase in hybrid Cloud, Cloud for AI / ML, serverless, Cloud to Edge, connected objects and IoT (Internet of Things), computer vision, Cloud for sustainability and sustainable Cloud, as well as trusted Cloud.

When companies start to consume resources in the Cloud (e.g., software vendors in SaaS mode, cloud native platforms, PaaS for application development, IaaS for compute and storage, CaaS for remote work, etc.), they necessarily use the public Internet network. And they face increasing major network issues as hybrid Cloud rises.

MULTI-CLOUD CONNECTION ISSUES

The public Internet network was not originally configured for Cloud uses, transferring today mission-critical data that drives business.

Key issues are now to define which services a company must choose for this network traffic:

- Is a traditional network access and, especially Internet access, is sufficient to support new business needs and digital uses?
- Is it sufficiently secured?
- What key points a company must consider to define its best network architecture at a reasonable cost?

In order to free themselves from traffic based on IPsec (Internet Protocol Security), companies are beginning to consider alternatives, in particular hubs to directly connect them to their strategic network operators, such as major public Cloud providers (CSPs), CDN providers as well as digital portals and platforms (AWS, Google Cloud, Microsoft Azure, OVHcloud, Facebook, Apple, Zscaler, Akamai, Cloudflare...).

AI: Artificial Intelligence – ML: Machine Learning – CDN: Content Delivery Network

PEERING PRINCIPLES

Peering might be considered as a shortcut to GAFAMs and Cloud providers

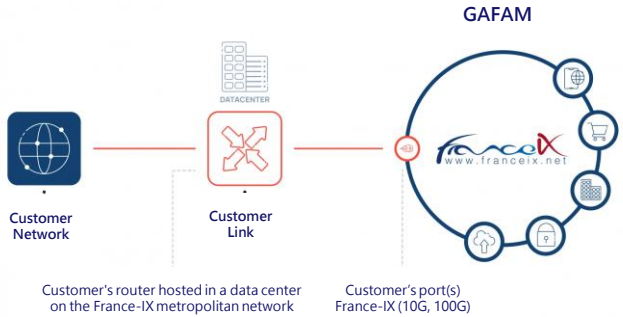
Cloud providers have been present on network exchange nodes for a long time. Theses nodes are of major interest for companies, due to the acceleration of their move to the Cloud and, especially of their multi-cloud strategies.

Peering offers them a simplified and optimized access to GAFAMs, and the opportunity to peer directly with other public Cloud providers.

One single physical port allows access to all providers.

Based on an open and free model, peering does not imply any contractual agreement with the Cloud provider and allows very fast commissioning by activating a BGP (Border Gateway Protocol) session, exchange route protocol between the AS (Autonomous Systems) of the customer and the Cloud provider.

PEERING WITH CSPs



WHY CONSIDERING PEERING?

Peering is a methodology among others to access to Cloud services. It is getting famous as a fundamental Internet strategy.

A peering hub can be compared to an airport hub where, to each terminal, a list of airplane companies is attached with reachable countries.

In a same way, a peering hub connect different operators in each of its point of presence (PoP). As all these PoPs are meshed, the company can take the best or the shortest path to reach its destination. In any case, it will reach its destination.

Peering infrastructures tend to be very redundant and local to a city. Network cores are interconnected via a triangle with the guarantee that none of the links of this triangle have common points.

OBJECTIVES OF THE STRATEGIC VISION PAPER

In order to make companies aware of the contributions of peering services to these challenges, France-IX has thought of developing a value-added report explaining and valuing peering benefits through representative use cases.

France-IX asked AdVaes, as an independent and neutral market intelligent company, to help it in this process, raising awareness on the subject through market insights and data, from interviews with French companies facing these challenges, and from use case of connections to Cloud operators.

As to better understand French companies' major network-related issues in this context and their willingness to use peering services. AdVaes conducted a strategic survey, based on 25-qualitative interviewed of French decision-makers in February 2022. The following pages reveal major results of this survey.

In addition, the report delivers concrete examples of use and expert opinions to better understand how companies manage their problems of access to different clouds and how the use of peering responds, by optimizing and streamlining access.

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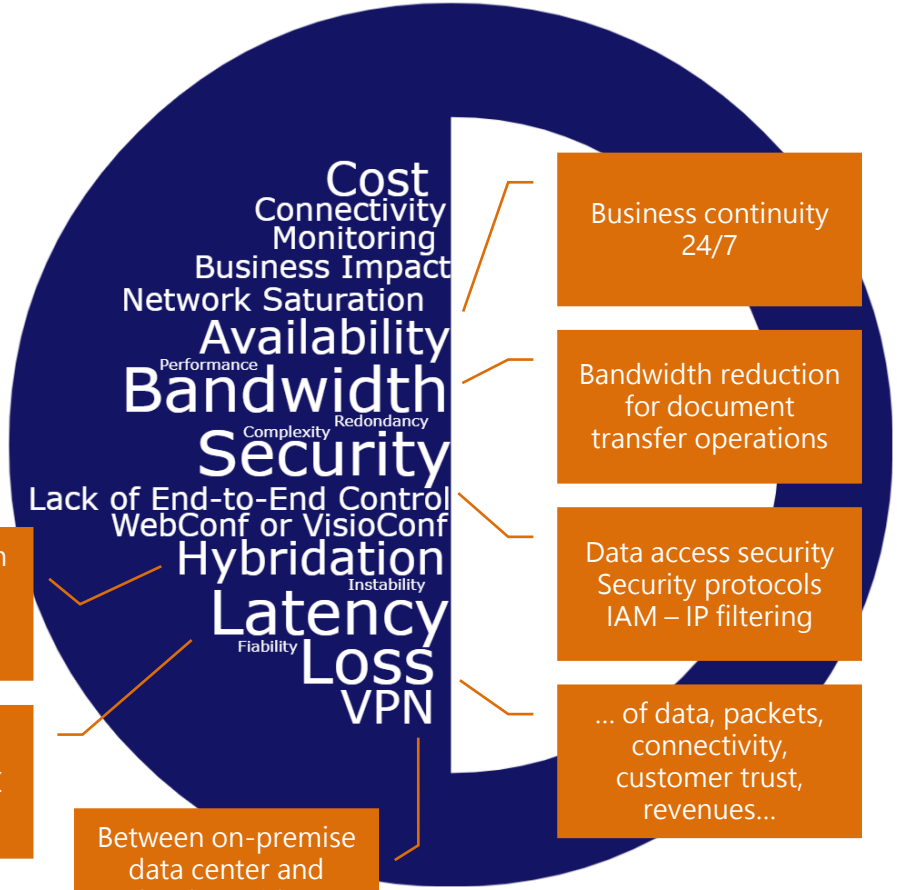
MAJOR NETWORK ISSUES WHEN USING PUBLIC CLOUD SOLUTIONS

French decision-makers interviewed do not face frequent connectivity issues when using public cloud solutions (IaaS, PaaS, SaaS). Only 12% mentioned facing on a regular basis (often) such problems. 44% of them say they rarely face it. Nonetheless, 32% underline the case arrive intermittently, that might cause critical issues when occur. Most of them are quite mature regarding cloud usage. This might explain these answers.

They were asked about their major problems faced when connecting to public cloud services. The answers to this open-question confirm that security is foreseen as a major issue. Nearly one half of the interviewees mention it as a verbatim. Various issues related to are identified belonging to data access, protocols and rules used, authentication, identity management… The other-two issues are related to network throughput, bandwidth and latency, specially between cloud providers and/or due to data encryption.

Other issues are related to cost, service availability, hybrid approaches, specific application service usage such as web conferencing or video conferencing, network saturation, monitoring processes, lack of end-to-end control, etc.

Question: Can you describe the problems encountered in terms of connection and/or interconnection to public cloud operators? Name the 3 majors.



Nb = 25 French decision-makers – verbatims

TOP 6 APPROACHES FACING CLOUD NETWORK ISSUES

To fix their connection problems to public cloud operators, 52% of French decision-makers interviewed mainly focus on two approaches:

- Subscription to direct connect services provided by their cloud operators and/or datacenter operators;
- Investment in network monitoring tools.

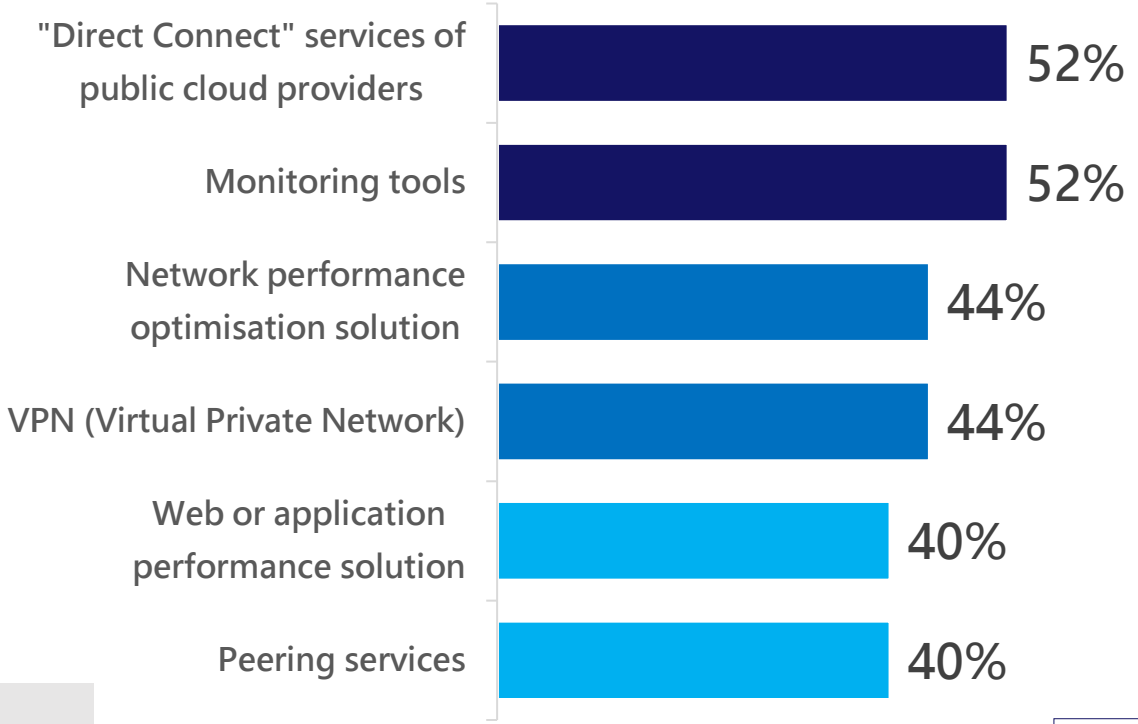
They combine approaches:

- 44% of those interviewed also use tools to optimize network performance and rely on VPN (Virtual Private Network);
- 40% also focus on web or application performance and peering services.

Peering services appear in the 6 main approaches French decision-makers investigate as to solve their network issues when connecting to cloud services. Others, mentioned in less proportion, refer to: software-defined networking (SDN) and interconnexion hubs for 28% of the interviewees. Content Delivery Network (CDN) is only mentioned by 16% of the interviewees as well as aggregation points located on Internet exchange nodes. And optical dark fibers links by less than 10%!

Question: How do you fix it?

TOP 6 APPROACHES



Nb = 25 French decision-makers – in % of responses (multi-response) – 15 approaches listed

USE CASE #1 – HYBRID ACCESS IMPROVEMENT AND COST REDUCTION

CONTEXT & MAIN CHALLENGES

A specialty chemicals and advanced materials company (more than 20,000 employees Worldwide), has the following challenges:

- Switching from a hybrid network to a full Internet network (e.g., privileged usage of the Internet);
- Improving the capabilities and performance of network services especially for Microsoft applications;
- Improving the provision of Internet links as the implementation delay of MPLS telecoms links is very long.

These challenges are the consequence of various changes the company is facing:

- Cloud-first strategy;
- More than 250 sites connected Worldwide through various network configurations (MPLS* + Internet);
- Fast merger and acquisition process;
- Explosion of collaboration tool usage and remote work;
- Increase of cyber-risks;
- Willingness to optimize telecom costs (the company uses low-quality public Internet access at low cost).

SOLUTION

In 2019, the company started a study to evaluate accurate solutions in the market addressing their challenges. It build a business case as to justify a SD-WAN approach. The results of the study revealed that with such approach:

- Costs optimization won't be pertinent due to their network specificity;
- Benefits will mainly rely on agility improvement, deployment speediness, and network management simplification.

The company estimated that SD-WAN technology was still immature for their project. And it decided to continue with a hybrid network model.

End of 2021, it revised its position when acquiring another company. The SD-WAN approach was the unique solution to rapidly connect new sites to the Group network, offering both simplicity in network management and the quality of service needed at a telecom level as to support the business' sites. Now, the company faces new challenges:

- Move MPLS access to high-quality Internet access for all sites;
- Change its connections to Cloud service providers, considering Express Route ou Direct Connect;
- Define the model of the SD-WAN solution.

BENEFITS & RESULTS

The choice in favor to a hybrid network has the following benefits:

- Simple, efficient and intelligent routing;
- Easy network management and deployment (e.g., multiple network links);
- Fast WAN services deployment, accelerating location opening;
- Cost reduction: lower circuit costs when replacing MPLS, avoidance of specific Cloud links (e.g., edge connect approach), reduction of 3rd party security service usage with seamless and direct connectivity to cloud providers...

> "The company seems to consider Express Route or Direct Connect. It not yet envisions Microsoft Azure Peering Service (MAPS) nor peering services as an answer to their hybrid network optimization. The company thinks of this solution while peering can address a large part of their challenges: SD-WAN makes it possible to select the most efficient Internet link according to the application used; peering allows it to improve access' performance to content. This a different and cheaper approach."

MPLS: Multi Protocol Label Switching

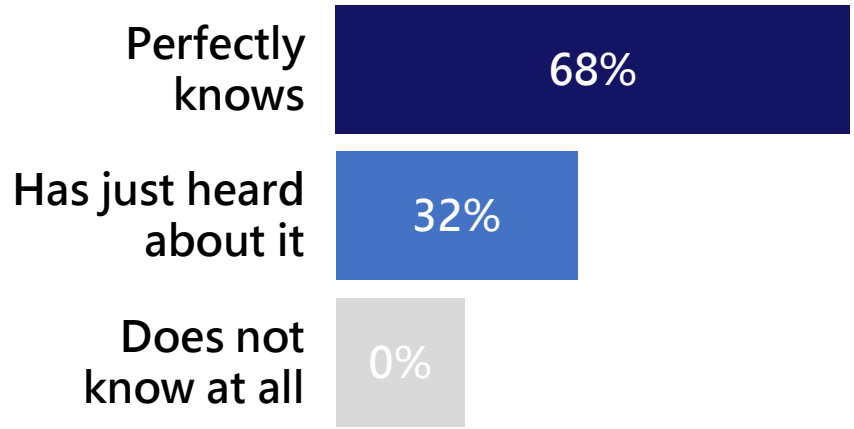
KNOWLEDGE OF PEERING SERVICES

French decision-makers interviewed are familiar with peering services, 68% of them mentioning perfectly knowing what these services refer to. None of them do not know at all these services.

Strangely, those who "have just heard about it" work in large companies (+5000 employees) rather providing services (banking, insurance, public sector). Nearly half of them are facing intermittently network issues when connecting to public cloud providers.

It is difficult to make any links, but it seems that company cloud usage maturity might by an indicator of its peering service familiarity level and propension to investigate its benefits. Indeed, most mature decision-makers regarding peering seem to be those that also have most mature approach regarding cloud usage.

FAMILIARITY WITH PEERING SERVICES



Questions: Are you familiar with peering services?

Nb = 25 French decision-makers – in % of responses

PEERING SERVICES AS A SOLUTION

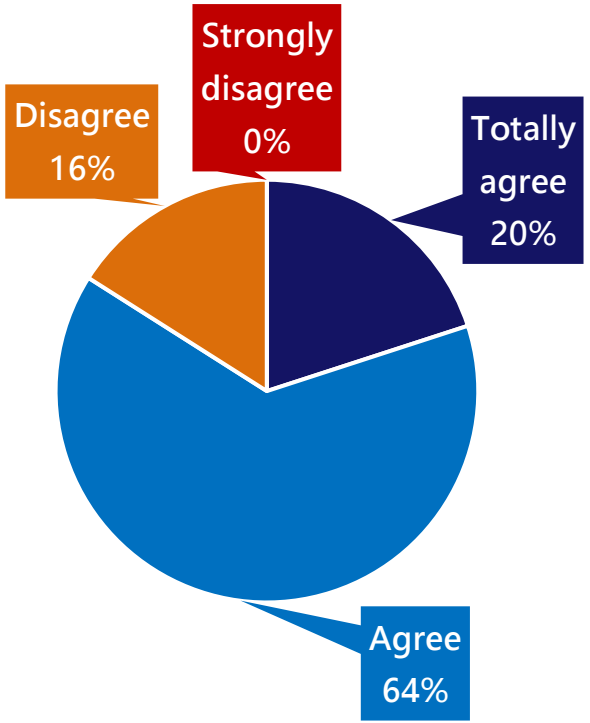
TO INTERCONNECTION ISSUES TO PUBLIC CLOUD SERVICES

Nonetheless, 84% of French decision-makers interviewed agree that peering services help to solve some of connection problems to public cloud service providers when they arise.

Those who totally agree are working for transportation or energy companies. Those who disagree are in majority working for retail, e-commerce of digital platform companies.

Peering definition:

Peering is the direct exchange of Internet traffic between actors. Exchange points facilitate peering.



Questions: Based on the definition suggested, do you think that peering services can address some or all of your problems of network connections or interconnections to public cloud services (IaaS, PaaS and/or SaaS)?

Nb = 25 French decision-makers – in % of responses

PEERING BENEFITS TO PUBLIC CLOUD SERVICE INTERCONNECTIONS

French decision-makers interviewed agree on two major benefits of peering services (for 48% of them):

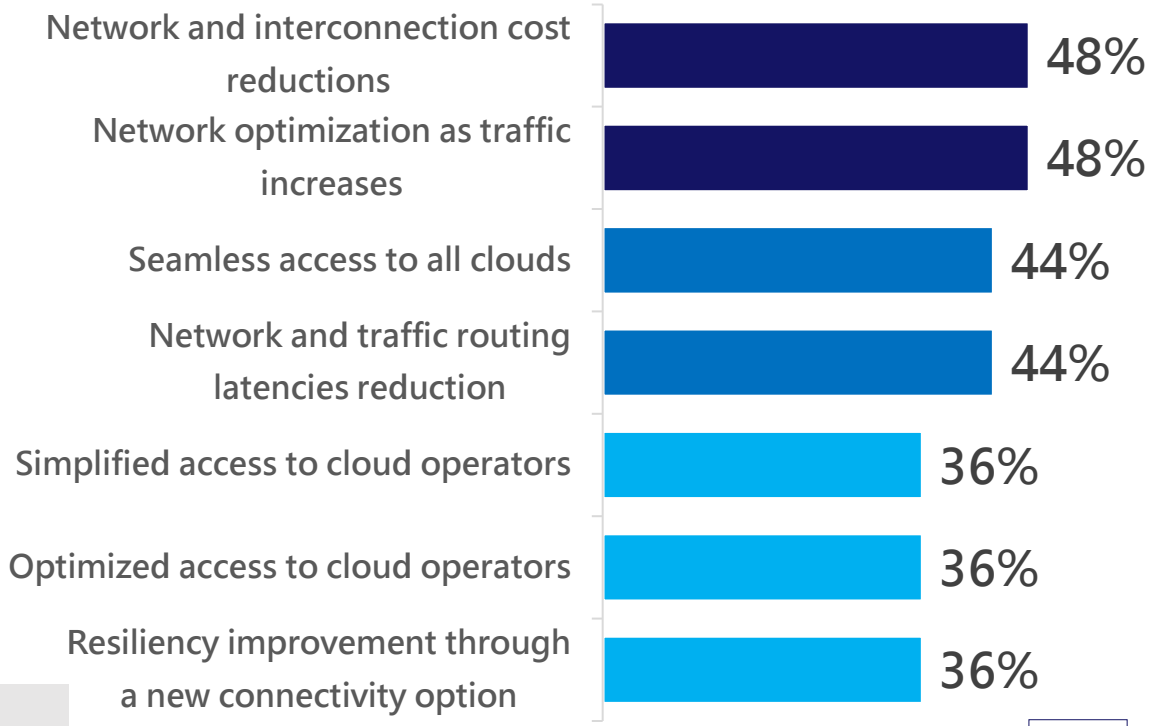
- Network and interconnection cost reductions;
- Network optimization as traffic increases.

They first mention benefits related to network in general. Then, they refer to cloud approaches:

- 44% of those interviewed indicate that peering services seamless the access to all clouds;
- 36% underline cloud access simplification and optimization, as well as resiliency improvement.

Question: What are the contributions of peering services to public cloud service interconnexions?

TOP 7 BENEFITS



Nb = 25 French decision-makers – in % of responses (multi-response) – 16 benefits listed

USE CASE #2 – PEERING SERVICES TO BETTER ACCESS TO CLOUD PROVIDERS

CONTEXT & MAIN CHALLENGES

EDF, an energy company and operator, operates its own datacenters on-premise (two sites based in Normandy region, North of France) as well as all of its telecom networks, especially WAN links between 650 company sites, in France and abroad, Internet accesses and bandwidth.

In 2014, the Direction of IT and Telecom Services (DSIT) of EDF redesigned its long-distance telecom networks: network connections of all company sites to its datacenters and all Internet accesses which, historically, ended-up in its datacenters.

EDF wanted to:

- Improve incoming and outgoing Internet connections;
- Reduce related costs.

The DSIT was also facing a natural traffic increase and was already anticipating strong trends, such as Cloud migration and remote working, which would gradually move traffic outwards the company.

Given this context, EDF carefully considered the contributions of exchange points and the value of public peering between companies.

SOLUTION

Peering services helped EDF:

- Being closer to destinations (especially content providers) and getting additional path to reach its destinations.
- Being ready to make its shift to the Cloud: services moving into SaaS mode, migration to Office 365.

Within France-IX, the presence of major public Cloud providers but also telecom operators involved in the company's increase of remote working, was key in the decision process. With sometimes 60,000 employees working remotely at the same time, implying simultaneous high bandwidth sessions, peering with telecom carriers allows to accommodate the need while lowering the traffic on its transit-based Internet links.

End 2021, through France-IX' peering services:

- EDF is connected to its major strategic partners (Microsoft Azure, Google Cloud, AWS, Bouygues Telecom and SFR);
- Network traffic reached more than 7 Gpbs compared to 1 Gbps when started.

Beyond, EDF has identified other destinations that should benefit with peering services and the company is studying to optimize access to these destinations, and to other communities and services.

BENEFITS & RESULTS

Peering allows EDF to:

- Improve technical issues and quality of service thanks to a direct route to privileged Internet destinations;
- Reduce the load on EDF's ISP links and lower latencies;
- Better access to strategic providers (Cloud, telecom, content…);
- Optimize global Internet traffic by unloading its access via transit providers;
- Improve security and add resilience, with a 99,99% overall availability rate of France-IX platform;
- Optimize costs and get substantial savings.

> “Since EDF started its project, from 35% to 50% of its traffic go through peering services. They were expected at least 30% and not such major results.”

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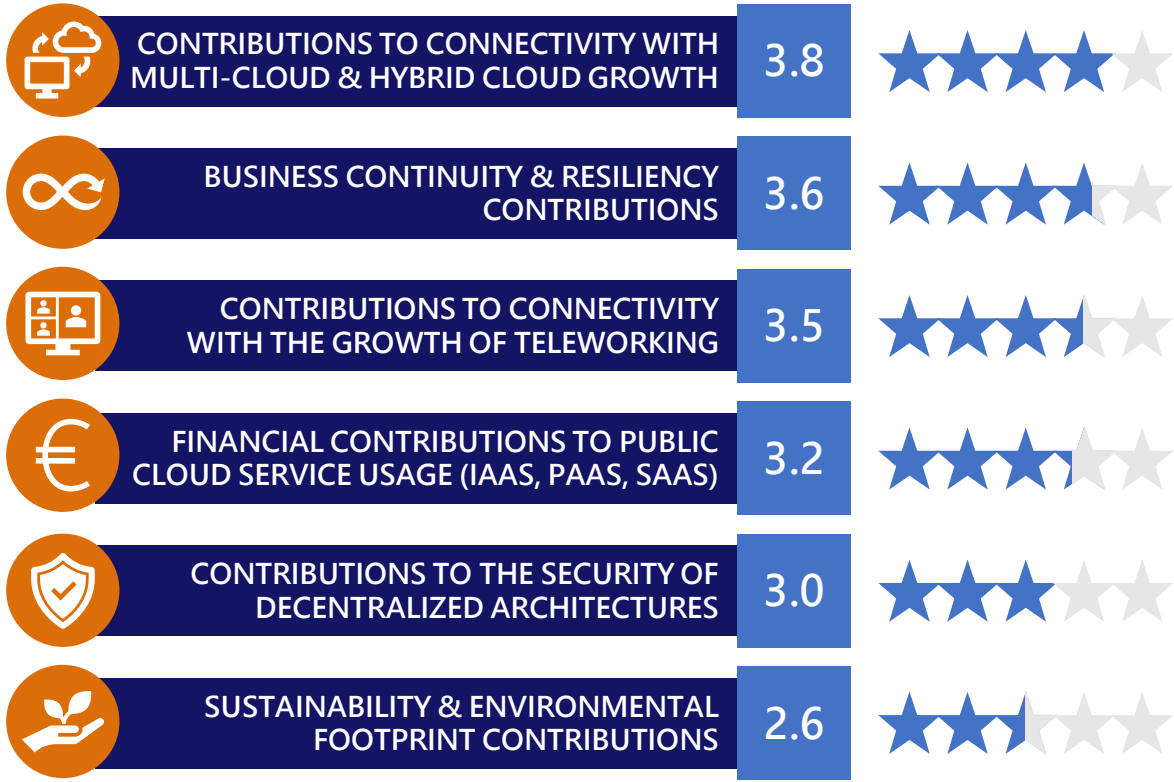
EVALUATION OF PEERING BENEFITS TO PUBLIC CLOUD INTERCONNECTIONS

Unsurprisingly, the primary benefit of peering services relates to connectivity as multi-cloud and hybrid cloud grow. French decision makers surveyed give a rating of 3.8 out of 5.

Next, they highlight business continuity as resilience needs increase (3.6 out of 5).

The increase in teleworking practices, due to the Covid-19 pandemic, has created new needs and generated connectivity conflicts. Peering services are considered as an answer to solve related problems. French decision makers surveyed give a rating of 3.5 out of 5.

Other advantages of the peering service on the financial aspects of cloud use, the security of decentralized architectures or environmental sustainability are less foreseen by these decision makers today.



Question: Evaluate on a scale of 1 to 5 the contributions of peering services (1 star = very negative benefit and 5 stars = very positive).

Nb = 25 French decision-makers – average score

USE CASE #3 – PEERING SERVICES AS A MULTI-CLOUD ACCESS IMPROVEMENT

CONTEXT & MAIN CHALLENGES

In 2018, a digital technology operator, providing high-speed connectivity, traceability and mobile software, and cybersecurity services, redesigned its Internet network, especially its core network relying on MPLS standards.

This project gave the company a higher visibility of its traffic typology, particularly on its Internet exchange points, and the opportunity to study various traffic optimisation options.

The company realised that the top 10 of their content providers were representing 50% of its incoming traffic and that 100% of these providers were working with France-IX.

SOLUTION

Joining France-IX community has 2 main objectives for the company:

- Improve Internet access performance;
- Rationalise IP transit interconnection costs.

As Cloud services, and especially public Cloud services, multiply in companies' information systems, direct access to the main public Cloud providers was a key decision point for connecting the company's network to that of France-IX.

First peering connections were made with providers already known. As soon as peering started to be deployed, more than 30% of company's incoming traffic moved immediately to network providers already known in the France-IX' network.

Then, other major providers were addressed such as Apple, Facebook, Microsoft and Amazon. When these interconnections made, more the 50% of company's traffic was routed according this process.

To better cope with traffic changes, the company has increased bandwidth from 2 Gbits to 10 Gbits.

Today, more than two-thirds of company's traffic goes through France-IX.

BENEFITS & RESULTS

The quality of service was improved with major public Cloud providers thanks to direct access to privileged Internet destinations.

Operational network transit costs decreased by half. The return on investment (ROI) was almost instantaneous.

Other benefits rely on:

- Key access to strategic players (cloud providers, telecom operators, content providers…);
- Additional security of transit links and resilience improvement;
- Better customer experience with major public Cloud providers thanks to network latency reduction.

EXPERT POINT OF VIEW

SIMON MUYAL

Simon Muyal is Chief Technology Officer at France-IX. He has 20 years of experience in networking and interconnection, alternating between network engineering, R&D and network operational roles. He is working on different projects to improve France-IX services (400G, automatic provisioning, SLAs).

Representing the largest internet exchange in France, he participates to various industry conferences such as the Global Peering Forums, NANOG, AfPIF and RIPE meetings*. He is an active contributor in the peering community and gives regular talks. He is helping on the technical development of IXs in West Africa (Morocco, Senegal, Congo). These contributions allow him to better understand major trends the peering ecosystem is facing to in different regions.

Prior to France-IX, Simon held different roles with RENATER, the French National Research and Education Network, where he worked for 9 years and operated the SFINX (Service for French Internet exchange). Simon holds his Master of Science from the French Engineering school, ENSEEIHT in Toulouse.

Simon joined recently the AFNIC's (Association Française pour le Nommage Internet en Coopération) scientific committee.

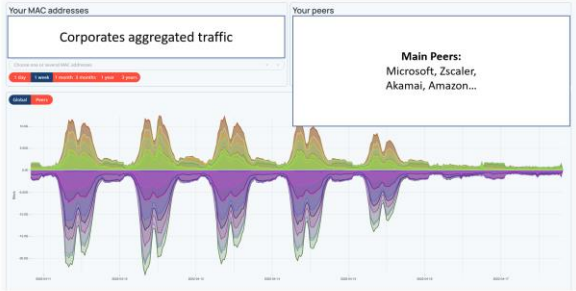
* Public Cloud providers are deploying infrastructure in Africa progressively, then some of them aim to deliver their services to African countries from Europe, specifically through the Marseille hub.

With its peering services, France-IX can add network value to large account and corporate companies when they connect to cloud solutions.

In their cloud transformation process, these companies are dealing today with different cloud providers. They mix approaches, using 2 to 3 leading public cloud providers (among AWS, Microsoft, or Google Cloud) plus 1 to 2 French players (such as OVHcloud, Scaleway, Ikoula…), on a multi-cloud or cloud hybrid way.

France-IX's members have access to a complete and rich ecosystem with a multitude of cloud providers connected. Some large accounts start with a small capacity port (1 Gbits), dedicated to a specific cloud provider stream, and rapidly enlarge it to 10 or 100 Gbits as to diversify access to other cloud providers with one single port.

Today, as they subscribe to multiple cloud providers, corporate companies want to have a flexible power strip, operated and managed by an independent third-party, as to facilitate and centralized the connection to these cloud services.



TECHNICAL CONTRIBUTION OF PEERING SERVICES TO CLOUD CONNEXION

Large accounts and corporate companies better know today what peering services are. Nonetheless, they do not really understand how to access to these services. When they consider the technology (value-added, risks and costs, benefits), they mobilize a pluri-disciplinary and transverse team composed of security and network experts, architects, and data center specialists.

Major contributions of peering services rely on:

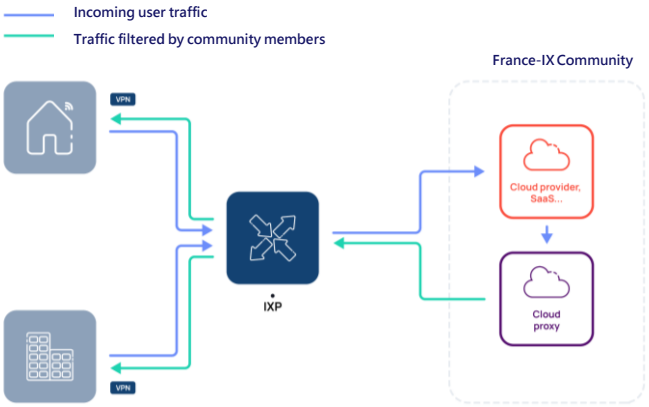
- One single access to multiple providers: a path that help to access all cloud players;
- Quality and performance, of access to cloud providers in specific situations (e.g., remote work) and better connection control of corporate infrastructures (VPN), telecom operators (including local operators such as Bouygues Telecom or SFR) and the Internet;
- Competitive costs and guarantee of being able to better absorb the increase in data flows without exploding costs.

France-IX's peering services can easily and rapidly be deployed in a company network infrastructure, without any risk, step by step if needed. Companies using peering services already master network protocols and redundancy techniques based on these protocols (i.e., BGP for Border Gateway Protocol). They only must add another access to choose the best route to all cloud providers.

EXPERT POINT OF VIEW

SIMON MUYAL

GUARANTEED TO EXIT AS CLOSE AS POSSIBLE, TO THE NEAREST MILLISECOND



France-IX covers major data centers in France (Equinix, Interxion, Telehouse, Data4 or Scaleway) where large accounts and corporate companies are already present. With the France-IX platform, companies that master BGP just have to put a port above that no longer routes to transit accesses which may be degraded or saturated, or even uncontrolled, but directly routes to cloud operators. It's just a matter of setting up one more BGP session with selected cloud providers. France-IX provides this service in one week (vs. several weeks if companies make the request to each telecom operator).

KEY MAJOR DIFFERENTIATORS OF PEERING SERVICES TO OTHER SOLUTIONS

France-IX peering services facilitate access to cloud operators, with a single access. Solutions from providers that aggregate a set of cloud operators and offer services, such as AWS Direct Connect or Microsoft ExpressRoute, are more cumbersome to set up and take longer to deploy (several weeks). Choosing these solutions, companies need to discuss with each cloud operator to be able to put the infrastructure in place. Even Microsoft now introduce a new way to favor peering solutions to lighten processes and make them more dynamic (cf. MAPS - Microsoft Azure Peering Services).

> *“Companies that connect to a France-IX platform with local players (AWS or Microsoft servers that will deliver the cloud service are located in the same Paris’ data center or in a data center a few kilometers), are guaranteed to exit as close as possible, to the nearest millisecond, because the infrastructure is local.”*
>
> *Simon Muyal*

Some providers aggregate networks with a lot of capillarity on a Worldwide level. They sell accesses which allow companies to exit as close as possible according to the criteria chosen by their telecom operators. These criteria may be in competition with others (access capacity). These providers have global networks, which is a strength, but with no guarantee of coming out as close as possible.

PEERING SERVICE BENEFITS TO SECURITY

Peering services address several aspects of security:

- Some large accounts and corporate companies also use cloud providers to filter contents (e.g., Cloudflare, Netskope or Zscaler). They pass through these cloud proxies to clean up traffic before the data arrives at user devices. These providers are also connected to the France-IX platform. They are part of the ecosystem. If corporate companies have a contract with them and with public cloud providers, France-IX will guarantee that the flow exchanges will take place on the same ecosystem without degrading performance (millisecond);
- Another aspect relates to DDoS protection. France-IX is offering a basic DDoS solution based on RTBH (Remotely Triggered Black Hole Routing). On the other hand, companies using the platform have the option of implementing a selective or restrictive peering policy by limiting themselves to a few players in the ecosystem. Combining both, they channel traffic (and not establish sessions with others). This makes it possible to secure the infrastructures.

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SURVEY METHODOLOGY

25 DECISION-MAKERS INTERVIEWED

Online survey done in February 2022 by AdVaes.

Selection of decision-makers to interview according to their level of:

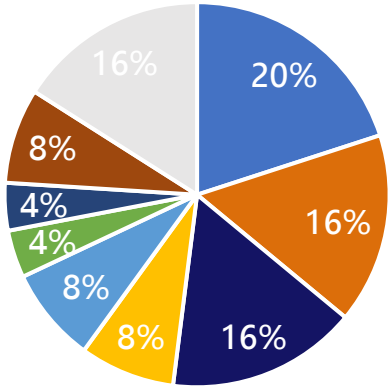
- Decision within CIO departments;
- Implication in IT infrastructure challenges;
- Expertise in cloud computing.

All of them mention their company uses public cloud solutions (IaaS, PaaS, SaaS).

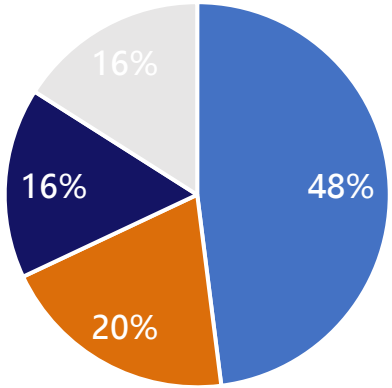
100% CIO OR EQUIVALENT

NB = 25 FRENCH DECISION-MAKERS

INDUSTRY SECTOR



COMPANY SIZE



ABOUT

FRANCE-IX

France-IX is a leading peering service provider in France and Europe markets. The company "connects on its neutral exchange points in Paris, Marseille and Lyon more than 500 different profile players" including Cloud computing infrastructure providers as well as most Telecom carriers and companies from various industry sectors. France-IX has 25 PoPs (Paris; Lyon; Marseille; Toulouse) for 2 Tbps of trafic.

As a neutral and independent structure, France-IX operates according to an associative model. The company supports its customers, companies with a network operating business model and/or with strong connectivity challenges, in their project to improve data networks, interconnections and connections, especially to the services of major public cloud operators (GAFAM). To strengthen its growth and open to other markets (corporate companies with access needs to cloud services), France-IX is positioning itself more and more beyond its original peering activities and more as a multi-service platform for interconnection, hosting and infrastructure management.

With the rise of digital usages, data exchanges and the use of cloud solutions (IaaS, PaaS, SaaS), companies are faced with connectivity and interconnection issues, which can be detrimental to the quality of the services provided. In their quest to optimize the management of their data flows traffic, their Internet connection and the hosting of their infrastructures, they do not naturally think of the contributions of peering and a multi-service platform like that of France-IX.

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ADVAES

AdVaes is a market research and intelligence company. It specializes in forward-looking analysis, positioning and scoring of digital solution providers in terms of sustainable and responsible use and offers operational strategic support. Analysis covers specifically the fields of cloud ecosystem solutions (IaaS, PaaS, SaaS) and data analysis and processing.

In terms of sustainable and responsible digital use, AdVaes focuses on initiatives in the following areas of CSR/ESG [1]: environment and sustainability; social equity, gender equality and inclusion; ethics and trust, protection of IT environments and data.

The company was established in July 2020 by Emmanuelle Olivié-Paul, formerly an Associate Director of Markess by exaegis, a consultancy and marketing services company specialized in analyzing markets in the digital industry, and a member of the management committee of Exaegis, a consultancy specializing in the development, adoption, and financing of digital technologies. Emmanuelle has over 25 years of experience in software markets and services related to digital technologies.

[1] Corporate Social Responsibility | Environment, Social and Governance

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