Spring 2017

Tendances

Connectivity

Looking to the networks of the future

Business Services

Nicolas Demassieux

**Senior VP,
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"The networks of tomorrow: moving towards ambient connectivity."

The networks of the future will need to be invisible and energy efficient. Part of the day-to-day lives of users and businesses, they will deliver ambient connectivity, which will become integral to their environment. It will be available in all areas of human activity and guarantee optimal quality.

As the digital economy's central nervous system, the networks of the future will provide businesses, employees and private individuals with everyday access to information anywhere and under any circumstances, and place the world within their reach. Businesses stand to gain from greater flexibility and the customization of solutions according to the profile and needs of each employee. It will significantly improve productivity and agility, particularly vital in a business environment where interaction inside companies and with partner ecosystems will play an increasingly important role.

Our challenge as an operator will be to support the technological development or revolution of our partners by centering our solutions on human beings, users and employees and their needs.

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New connectivity, new challenges

Networks now play a key role in improving employee productivity and developing new customer services, though they increasingly face challenges around service quality and security.

Service quality, for example, is under scrutiny due to the surge in connected uses and the resulting acceleration in bandwidth demand.
The connectivity needs of businesses—cloud-based applications, videos and connected things, at work or on the go—have never been greater, across every sector.

Integrating cost control and higher demand

Growing user needs must be met without driving up costs.
Combining flexibility, service quality and security, network architecture is being reinvented across the board.
The challenge will be to increase the productivity of employees by providing them with new ways to accomplish tasks.

Performance-enhancing tools for employees

As corporate digitalization grows, so does the range of digital tools available to employees. From business to collaborative applications, each tool is designed to streamline processes and help users complete everyday tasks.
The corporate network should be structured to deliver an optimal connection to each employee.

Enhanced service quality for customers

The network is also a key customer relations tool, serving as a performance accelerator for employees. It facilitates access to the company's services for as many people as possible, through websites or by putting them in touch with customer services, and so on.
Capacity and reliability are essential for

x95

Global Internet traffic in 2020 will be equivalent to 95 times the volume of the entire global Internet in 2005.

Source: Cisco White Paper, June 2016

X95

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x7

Global business mobile traffic will increase sevenfold between 2015 and 2020.
Source: Cisco White Paper, June 2016

peak connection absorption, particularly for activities with a strong seasonal pattern. New-generation networks provide companies with the flexibility they need to adapt infrastructure to demand.

Secure data and communication

New working methods increase areas of vulnerability on networks.
The line between private and professional is blurring, and mobility increases the risk of exposure to malicious attacks. We need to adapt and innovate on cybersecurity to increase efficiency.
No longer confined to network entry and exit points, security applies at every level, including devices and connected things.
To optimize user freedom and secure use on the go, security features are hosted in the cloud.

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Olivier Martinez,
Chief Counsel Orange
Business Services

"Ultra connectivity: the legal challenges"

Networks are evolving. With them, the contractual and legislative tools available to companies and operators are changing too.

From a contractual standpoint, how can companies address the new digital issues they are facing?

Olivier Martinez: Contracts are key elements in customer relationships. They are increasingly focusing on quality of service and its assessment, as well as on providing solutions to incidents should they occur. However, the digital transformation under way in companies as well as the increasing flexibility allowed by the networks mean that we must go further in adapting our contractual tools. That is why we are working on new types of contracts, with shorter life cycles among other things. They will allow us to be flexible and responsive in order to adapt constantly to changing customer needs.

What legal questions are raised by the new networks?

O. M.: We are facing a real explosion of data generated by the new digital environments: securing our data and the data of our customers is thus becoming a major concern.
As early as 2018, a new European regulation will provide for a strengthening of the protection of personal data, in particular through greater accountability of the actors in charge of their processing. Orange Business Services is already working on solutions to meet these new challenges.

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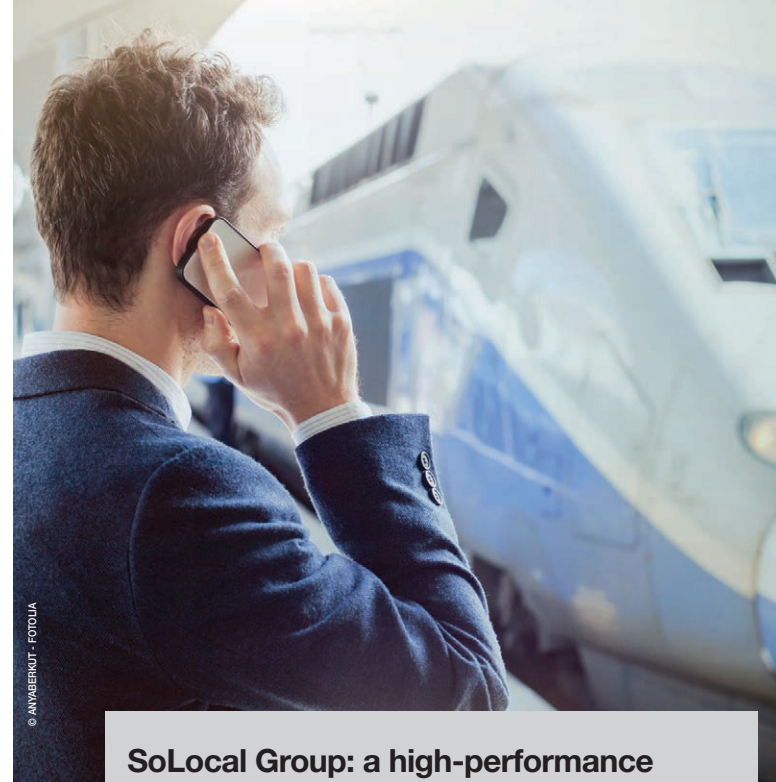
SoLocal Group: a high-performance network for more effective sales reps

SoLocal Group, whose subsidiaries include Pages Jaunes and Mappy, has transformed its network infrastructure to meet the growing bandwidth needs of its employees.
"These changes were driven by business lines and users, which is often what happens," explains Christophe Géraud, Head of Networks at SoLocal. The switchover from a centralized to a distributed architecture not only aims at delivering more seamless access with optimal service quality, but also guarantees the same level of security as a standard Internet interconnection. The teams quickly felt the difference, particularly sales reps such as Alain.
He's constantly traveling, so he really needs to be able to work from the office and on the move. An Internet connection in meetings is essential. Now he's got all he needs to win over new customers.

French Ministry of Foreign Affairs: digital diplomacy

A wind of change is blowing through French embassies across the globe. The French Ministry of Foreign Affairs has completely overhauled its network, with one major goal in mind—optimizing access to information.
For expatriate staff, what this means in practice is more online services, from consular and civil registration to administrative formalities for people returning to France. Or, in other words, it streamlines dealings with the ministry and makes document management easier. Diplomats will also benefit from these infrastructure changes. Access to social media, limited until now, has been opened up to provide staff with an additional source of information and an extra external communication channel.
Embassy staff will be provided with support to use these new features, and new technology skills have been developed to keep the initial momentum going.
"Digital technology is going to be critical in revolutionizing the network and infrastructure, but also work practices," explains Philippe Lefort, Information Systems Director at the French Ministry of Foreign Affairs.

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Hybrid networks, a response to tomorrow's challenges

In the face of increasing needs for flexibility, traditional networks show their limits. Could hybrid networks be the solution? Jean-Claude Le Gouëdec, Corporate IT Architects Team Manager for Amcor, the world leading group in packaging solutions, hints at an answer.

What are the impacts of digitization on the needs for your network?

Jean-Claude Le Gouëdec: Digitization is at the heart of our teams' daily jobs: cloud-based applications, HD video in conference rooms...
Our employees have come to expect an irreproachable quality of service in their professional framework and a full access to web contents from their workstation... These new uses have an impact on our network.
Five years ago, 5% of our traffic came from the Internet, now we are at 80%. And this will increase even further in the future.

What have you implemented to address these developments?

J-C. L.G.: We made the design of our network evolve and we reorganized the management team which is in charge of it. Our architecture was based on a classic configuration, with regional internet gateways. By 2017/2018, a majority of our

240 sites around the world will migrate to a hybrid solution.
This will allow an intelligent traffic management, between the Internet and lines reserved for sensitive information. We strive to offer a high level of ease of use to all our employees, with an ever-efficient connection and open access to social networks.

What about security?

J-C. L.G.: It must evolve. The new design of the network is multiplying entry and exit points and hence creating new danger zones which needs to be protected. But, the vulnerability of a company comes above all from its teams. Security is displaced on employees or on applica-

tions on their PC and their smartphone. We can implement every technological solutions available, if the employees are unable to detect a fraudulent mail, security remains exposed. That is why we have just launched an information campaign aimed at all our end users.

What are your international challenges?

J-C. L.G.: In some countries, particularly in Asia and South America, it can be difficult to set up a line with a satisfying speed connection. In addition, the costs to access the service often remain very high and the poor user experience slows down the deployment of certain technologies. The implementation of hybrid

networks will change this situation. Instead of going through a centralized architecture, which slows down the connection, our teams will be able to use local lines to browse the Internet. The experience will be considerably improved.

What would be the ideal future network for you?

J-C. L.G. : It would be a totally adaptive network, capable of following our needs in bandwidth very reactively. With unlimited lines at our disposal, we could

configure and use it on demand. And, of course, security would remain a central element. Another key point is accessibility.
With the advent of the cloud and the «SaaS» (Software as a Service) model, which makes software available to customers via the Internet, data and applications are accessible everywhere... Given that it is possible to be connected! Without a network, the benefits of these tools disappear. We must continue to deploy new solutions to enable constant connectivity.

Will future solutions be jointly developed?

The teams at Orange Business Services think so. They foster continuous interaction with users to co-develop their services. In France, "Network Explorers," a community of Orange customers and employees with a shared interest in the networks of tomorrow, was recently launched to do just that.
As with most Orange clients in Switzerland, Amcor is a member of the Swiss User Group, which operates on a Network Explorers model.

> ## "The ideal network? A fully adaptive network capable of tracking the needs of each company in real time."
>
> **Jean-Claude Le Gouëdec,** corporate IT architects team manager for Amcor

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Network revolution

Originally developed as customizable services, corporate networks have grown in flexibility, opening up opportunities for new team uses and redefining the role of IT services.

The network is the company's nervous system. Without it, there would be no more community, movement or responsiveness.

To meet new user needs, the network needs to be reinvented.

Once physical and strongly hierarchical, its infrastructure is now dematerialized and decentralized, increasing the resources available to employees as a result.

End of an era

Until recently, network design was relatively inflexible.

Architecture was often oversized to meet unpredictable needs. Implementing new solutions—the launch of a website or the addition of a service—was a cumbersome process, limiting the adaptability of infrastructure to corporate needs.

Enhanced flexibility for high-performance users

The emergence of SDN[1] and NFV[2] technologies has changed the way we use networks.

Connections management and allocation to appropriate channels increases bandwidth capacity without placing excessive pressure on costs. For employees, this opens up previously limited uses, such as videos, social media and web applications. On the other hand, the virtualization of network functions delivers unprecedented service deployment flexibility adapted to work on the go.

Turning infrastructure into service

Networks are now "customized" for use (NaaS[3] approach).

At the click of a button or two, a new service can be quickly launched, imple-

50%

Half of employees say their ability to work anywhere, anytime is the single most important productivity factor.
Source : The Economist Intelligence Unit, 2016.

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mented directly online and made operational without the need for technical support. The system is developed in real time to seamlessly reflect a company's transformation and to implement the resources users need.

Cyberdefense: the cornerstone of future networks
Cyberdefense solutions—software reverse engineering to understand internal functioning, intrusion tests, cloud or embedded security, and so on—are already a reality. They provide teams with day-to-day peace of mind.

The IS manager: an agile architect
These solutions totally redefine the role of the IS manager. Relieved of physical infrastructure management tasks, IS managers can coordinate network solutions and focus on the needs of business divisions.
Additionally, they can create optimal conditions for teams to complete their tasks.

Siemens: reinventing the network of a high-tech leader

Siemens has embarked on a root-and-branch digital transformation. To achieve its goals, it is planning ahead and has a clear vision of its target network. "It will be public, like a big Internet," explains Frederik Janssen, Director of Global IT Infrastructure Service Portfolio & Strategy at Siemens. In other words, the infrastructure will be solid enough to guarantee the service quality of even the most critical applications. It will also be flexible enough to use on a "pay as you go" basis. And it will always be ready to meet future challenges. The network will be segmented finely enough to leverage effective control for enhanced security. Users still stand to benefit from improved connectivity with optimal security, without having to deal with technical issues.

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"We are already developing the networks of tomorrow!"

What will corporate networks look like in the future? Pierre-Louis Biaggi, VP, Connectivity Business Unit, Orange Business Services, casts his eye on future opportunities.

How will corporate networks change in the years to come?
Pierre-Louis Biaggi: We're going to see seamless WAN-LAN networks. The approach will be global, integrated and continuous for equivalent performance, regardless of whether infrastructures are hosted by the company, with an operator or in an outsourced data center.

How will it work?
P.-L. B.: The fully digitalized network will function on-demand, changing the way we use it. The operator's offering will need to change as a result.
The network and associated functions, such as security, flow acceleration and so on, will no longer be supplied on a subscription model but "as a service." Customers will be billed for usage, according to the number of users, applications used, and so on.

### Will the network still be fully secured?
P.-L. B.: Security won't be defensive—in response to attacks—or patched. Instead, it will be built into the network, with more stable and effective security functions.

What will the IS manager's role be in the future?
P.-L. B.: Managers will need to evolve to enter the "self-service" era. Network complexity will be invisible in the future.
The network as a whole (LAN, WAN, cloud, and so on) will adapt almost instantly to corporate needs, while maintaining service quality. The IS manager's role will be primarily to match business needs to applications.

This will form part of the continuous transformation of networks, including their virtualization. With SDN(1), all intelligence is application intelligence.

Pierre-Louis Biaggi,
VP, Connectivity Business Unit,
Orange Business Services
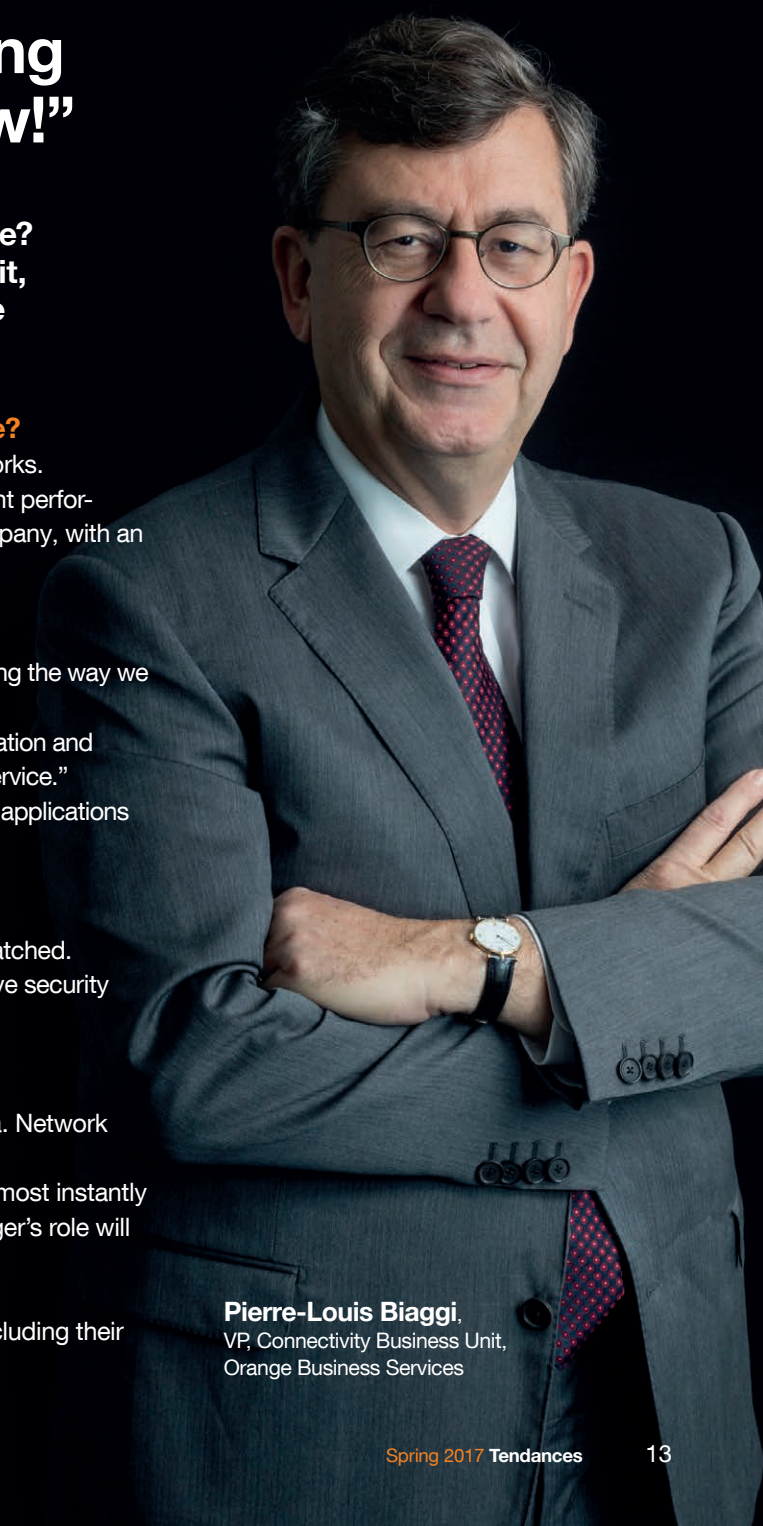
La Française des Jeux: a glimpse of the future

With 30,000 points of sale, non-standard connection peaks and mandatory data security obligations, the network of La Française des Jeux (FDJ), operator of France's national lottery games, is one of the most sophisticated in France. The man responsible for its development, Chief Technical Officer Guy Faia, leaves nothing to chance.

What are the specific features of the Française des Jeux network?

Guy Faia: Our network is our nervous system. It has a unique architecture, with 30,000 points of sale in France. It needs to deliver excellent performance, disseminating and transferring a large volume of data. In addition, we have a security performance obligation for information flows within our network. We have implemented complex Big Data systems to detect fraud and money laundering and to secure our games. At FDJ, trust is everything.

What about your particular line of business?

G. F.: We have one of the most powerful networks in France. It can collect data from all of our points of sale with robust transactional peak absorption—up to 1,000 operations a second. And we are preparing for even higher peaks in the future.

We are going to provide new on-the-go services, such as payment solutions on user devices. To achieve this, we need to develop our networks to deliver wireless and secure connectivity to players at our points of sale. That's why we are currently working on 5G and other technologies.

What do you expect to happen in the future?

G. F.: We have to keep pace with the digitalization of our environment. We need to provide everyone at each point of sale, anywhere and at any time, with a reliable connection to online services. This connection will need to be available everywhere, and coverage will have to be increasingly broad. The networks must meet these needs, maintaining consistently high quality and doing so at competitive rates.

How will networks meet data security requirements in the future?

G. F.: This will be the most important value-added service for networks in the future. How do you guarantee competitively priced security to open doors and forward ever-increasing qualities of data? You need to integrate this dimension from the start, as part of the system-design process, and the responsibilities of users and operators need to be clearly assigned.

Technologies are developing at a rapid pace; the law needs to reflect these transformations.

> To learn more about the legal challenges raised by new networks, see page 6 of this magazine.

What sort of relationship will operators and users have in the future?

G. F.: Operators will need to jointly develop professional networks with their clients.

Each company will have very specific demands related to its activity.

They will expect operators to understand a portfolio of technologies, while providing an overarching vision, and apply these innovations in practical ways to meet the specific needs of each company.

We need cross-functional engineering able to understand and adapt to rising network use and to meet our challenges.

> **"The operator will need to jointly develop networks with its clients in the future."**
>
> **Guy Faia,** Chief Technical Officer, Française des Jeux

Homo connectus: the heart of the network

From connected vehicles to smart cities, pointless gadgets to industrial machines, plants to animals, everything will be connectable in the future. And human will be at the center of tomorrow's network developments.

New networks, instead of putting humans out of the picture, will deliver unprecedented collaborative opportunities.

Promoting collective intelligence
Technological innovations will enable employees with greater flexibility and mobility. "Up until now, the collaborative network and infrastructure were proprietary solutions. But we're moving into a world of smart ecosystems and innovative solutions developed through co-innovation and crowdsourcing, which involve consumers in the process," explains Philipp Ringgenberg, Director of Digital Business Consulting Europe at Orange Business Services. Networks will be adapted to promote interaction between co-workers within the same company. Access to data and information sharing will be extended to broader ecosystems in order to integrate external partners.

More interaction with customers
The major challenge that companies face today is forging personalized ties with customers. It's a goal that will continue to drive the development and marketing of innovative services. People will continue to act as intermediaries, but will obviously be instrumental in putting a human face on an increasingly digitalized company.

Reinventing the customer experience
Practical initiatives have already been put into place. "More and more companies use the Wi-Fi network as a marketing tool," explains Jean-Luc Vallejo, VP Marketing Managed Mobility Services and Digital Workspace at Orange. Exclusive services like maps, programs and promotions can be offered to people at visitor attractions like amusement parks and stores. This will provide a starting point for strengthening and deepening its relationships with customers. The new 5G network will open a new era for collaborative working and the customer experience.

> **Companies will need a 'human touch' to improve their market performance."**
>
> **Philipp Ringgenberg,** Director of Digital Business Consulting Europe, Orange Business Services

Connected day

6:30am: morning jog
remote switch off of heating
monitoring of health data

8:00am: transportation
connected car
hands-free calls
computer-assisted navigation

9:00am: work
cloud applications
instant messaging
videoconferencing

12:30pm : shopping
online orders
personalized welcome via Beacon
payment by phone

2:00pm: on the move
IP voice calls
business applications
city bus schedule

7:00pm: home
VOD
high-speed download

11:00pm: concert
digital arena
social networks

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Cyberdefense: a key turning point

Cybersecurity practices are also changing at a rapid pace. An increase in connected devices has expanded the potential attack surface. But innovative solutions are available to limit the risk.

€354 billion

The estimated annual cost of cyberattacks to businesses.
Source : Lloyd's, january 2015.

The network of the future will allow users to connect anytime, anywhere, from any device. This will allow objects to communicate with each other or with applications. The old approach—creating a watertight corporate network—is neither adapted nor effective in this bold new world.

Cyberdefense specialists have got the upper hand in the race against the hackers, phishers and other cybercriminals. How?

By adopting enemy tactics. "Our experts simulate malicious attacks to test network security and spot flaws from the outside," explains Frédéric Zink, Director of Infrastructure Security at Orange Cyberdefense. "Then we implement solutions to fend off these attacks."

New protection approach

Native cybersecurity systems are being developed as part of this approach. "Everything connected to the network, from badge readers to workstations, is now an area of vulnerability," adds Frédéric Zink. "And optimizing connectivity to constantly jump from one environment to another complicates matters further."

The new approach is to equip object sensors and connected devices with embedded security solutions. How? By changing their OS code and then updating it regularly. "Our priority is to deliver a fully secure network, which is why it's essential to secure mobile devices," concludes Frédéric Zink.

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Cybersecurity: always alert

Interview with Franck Perillier, Head of Information Systems Security at Club Med.

What security issues do you currently face?

Franck Perillier: There are three main issues. First, we've seen a rise in messaging attacks, which means we have to deal with, for example, "ransomware," software that blocks access to computers and files and demands a ransom. Second, we have to guarantee the conformity of our personal data with the security standards of the payment cards industry (PCI-DSS), for example. Lastly, we need to control "shadow IT," when users bypass procedures to access uncontrolled applications.

How do you guarantee the security of your networks?

F. P.: Our architecture is heavily segmented. Critical information systems are on dedicated networks, highly filtered, traced and controlled with AdminBastion, and so on. With support from HRD, we are also raising the cybercrime awareness of our employees. We're strengthening application security with ongoing code audits, intrusion testing, etc., since an insecure application is an area of vulnerability for the network. For cloud services, we are systematizing a risk and security assessment procedure for partners. Lastly, "ransomware" has pushed us to improve our security incidents management and develop closer ties with solution providers.

How are you preparing for future security challenges?

F. P.: Digital transformation is picking up speed. To stay in the race, security functions need to become "business partners." Technologies are becoming more widely available and are evolving very fast. It's essential to develop a "geek culture." We aim to achieve this through more frequent technical audits. The cloud and its "distributed IS" require us to hold business line players to account, challenge subcontractors and think about security (proxy cloud, etc.). And to do so seamlessly with internal security through ID management, log collection and centralization, and so on. In this regard, we need to build our detection capacity through engaged and coached IT teams. Because Artificial Intelligence will help, but it can't do everything. We will also need to rely on expert partners we trust. Strength in unity.

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Network players

More than a simple technical partner, today's operator routinely supports businesses in the transformation and use of their network and services.

Straightforward information system organization

The deployment of new solutions, such as the SDN, transforms routine business operations.

Based on process digitalization and automation, networks and applications are constantly developing to meet new needs. This flexibility enables ISDs to improve their autonomy and agility.

Design and integrate an adapted infrastructure

The success of this digital transition depends on a global strategy that guarantees a uniform level of service and security.

It requires cross-functional expertise to develop a system that is compatible with the existing ecosystem and is easy for users to administer.

This vision drives the teams at Orange Business Services throughout the integration process. It also guided their design for a management interface to simplify bandwidth parameterization, mobility tools supervision and the monitoring of operations history.

Monitor and support developments

Once these solutions have been implemented, the Orange Business Services team continues to provide network managers with support. More than 2,600 experts in "Major Service Centers"—expertise centers that develop knowledge with each customer interaction—support 4,600 employees in the regions.

They are able to provide real-time support to IT departments but also to identify recommended actions. The aim is to support the company in its digital development in order to help it go where it wants to go.

7,200

This is the total number of Orange Business Services employees working in customer services.

Source : Orange

Team innovation

Our 8,000-strong research and innovation teams are the architects of future solutions, developing the next generation of technologies. We talked with Éric Hardouin, Vice President, Ambient Connectivity Research, and Brigitte Cardinael, Software Infrastructure Research Unit Manager, who are inventing the networks of tomorrow.

What remains to be done to make ambient connectivity a reality?
Éric Hardouin: We want the network and connectivity to be as available as the air we breathe, with the best possible data transmission quality for fluid, obstacle-free use. We will reach this target, but there's work to be done before we get there.

Could you tell us more?
E. H.: Firstly, the radio frequency spectrum. We are looking into technologies to increase the amplitude of the ones used for network connections. This approach aims at using high frequencies, not used at the moment, to have enough radio resources to supply everyone with a high minimum data transmission rate, near or far from relay stations. It will be one of the leading features of 5G. Another area we are looking into is uniform coverage.

How do you plan to cover the whole territory?
E. H.: Where connectivity is already good, we need to increase the density of the network using smaller cells. We are also working on "crowd networking," which relies on third parties to improve coverage. An example would be connected cars with onboard WiFi access points. If car owners keep the WiFi on when their cars are parked, pedestrians could pick up the WiFi signal. Lastly, we are working on expanding cell coverage to 100 kilometers to cover wide areas with broadband using a small number of relay stations. The goal is to provide access to the Internet for people who do not currently have it for economic reasons, particularly in emerging countries.

Éric Hardouin,
Vice President, Ambient Connectivity Research

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The future is green!

We need to ensure that future technological developments don't come at the expense of the environment.
This is why the network of the future will take a "green" approach. Current innovative actions include the installation of energy-saving data centers, the reuse of excess heat for operator heating and, for homes, businesses and local authorities, the selection of efficient information technologies and networks, infrastructure standby, and so on. At the same time, 5G is likely to open up major environmental opportunities, such as halving the energy consumption of mobile networks and multiplying exchange capacities by one thousand. These new network possibilities will allow us to provide innovative solutions to environmental challenges.
They will foster the emergence of new urban planning and remote meter-reading services—the foundation for the successful smart cities and electricity grids of tomorrow.

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"Virtualization and pooling will enable to shift bandwidth from one client to another, optimize usage and costs for the company, and deliver the quality of service expected."

Brigitte Cardinael, VP, Research Domain Software Infrastructure

A network with a human face

Managing your company's network is about more than technology, and it depends on close daily cooperation between company and operator. Laurene Debas-Fort, After-Sales Service Team Manager, and Fatiha Bara-Kemmache, Customer Services Director, explain why it's important to work hand-in-hand with clients.

What types of clients do you work with?
Laurene Debas-Fort: At the France MSC (Major Service Center), we support all of our clients, regardless of their structure, which varies from multinationals to SMEs and doctors' clinics. We also guarantee emergency service networks for the police, hospitals and ambulances. We identify the causes of possible service disruptions and deploy diagnostic technicians to resolve them.

What are the most common causes of service disruption?
L.D.-F.: Outages can be caused by lots of things—cables cut by roadwork, storms, strong winds, fallen power lines, and so on.

What are the possible consequences of service disruption?
L. D.-F.: Most businesses rely on computer systems. Factories would probably come to a standstill without them. Service companies without access to email would lose business.
Without a network, you can't connect to the data center server that hosts business applications in the cloud. But we keep a particularly close eye on emergency services like ambulances and the police.
We implement circumvention devices, such as call forwarding and 3G routers, to provide a back-up service in the event of an incident, while our teams sort out the problem.

In the future, could we achieve 100% connectivity for everyone?
L. D.-F.: With physical wired links, there's always a risk of outage. But with 4G, we should be able to manage it. The radio link is, for me, the solution of the future and guarantees a minimum of service, even during network outage.

Laurene Debas-Fort,
After-Sales Service Team Manager, Orange Business Services

What do your clients require from their networks?
Fatiha Bara-Kemmache: They increasingly need to outsource the management and supervision of their networks. So we provide them with managed infrastructure services and third-party equipment integration.
We aim to operationally integrate solutions supplied by Orange and/or third party suppliers into unified governance structures.
We provide multi-suppliers services integration (MSI).
This approach allows us to improve the global performance of the client solution. Another advantage is that the client has end-to-end visibility via a centralized digital portal.

How do you support your clients through this process?
F. B.-K.: We work with the client to define the service management processes adapted to their needs and organization and make a centralized management application available to them.
They benefit from global incident supervision via a unique digital interface, which can be connected with the client incident management application. This portal offers a number of features by taking into account the specific nature of the client's activities.
At the same time, we support the implementation of this service by providing user teams with tailored operational training.

Networks are changing at a rapid pace. What advice do you give to clients facing this transformation?
F. B.-K.: Our clients are concerned about hybrid networks and ways to secure them. More and more, we're also advising clients on how to respond to DDoS (Distributed Denial of Service) attacks, which are increasingly common. In general, we've noticed a basic trend: our clients increasingly consult us upstream for proactive advice. They want close support.
We're seeing a shift from an incident-response approach to one based on anticipating network solutions.

Fatiha Bara-Kemmache,
Customer Services Director, Orange Business Services

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International: the ubiquitous network dream

In Europe, North America and many regions of Asia, information highways have made high-speed data transfer a reality. The widespread use of fiber optics has further accelerated performance. But outside these areas, the solutions are waiting to be invented, explains Yves Bellégo, Director Network Strategy at Orange.

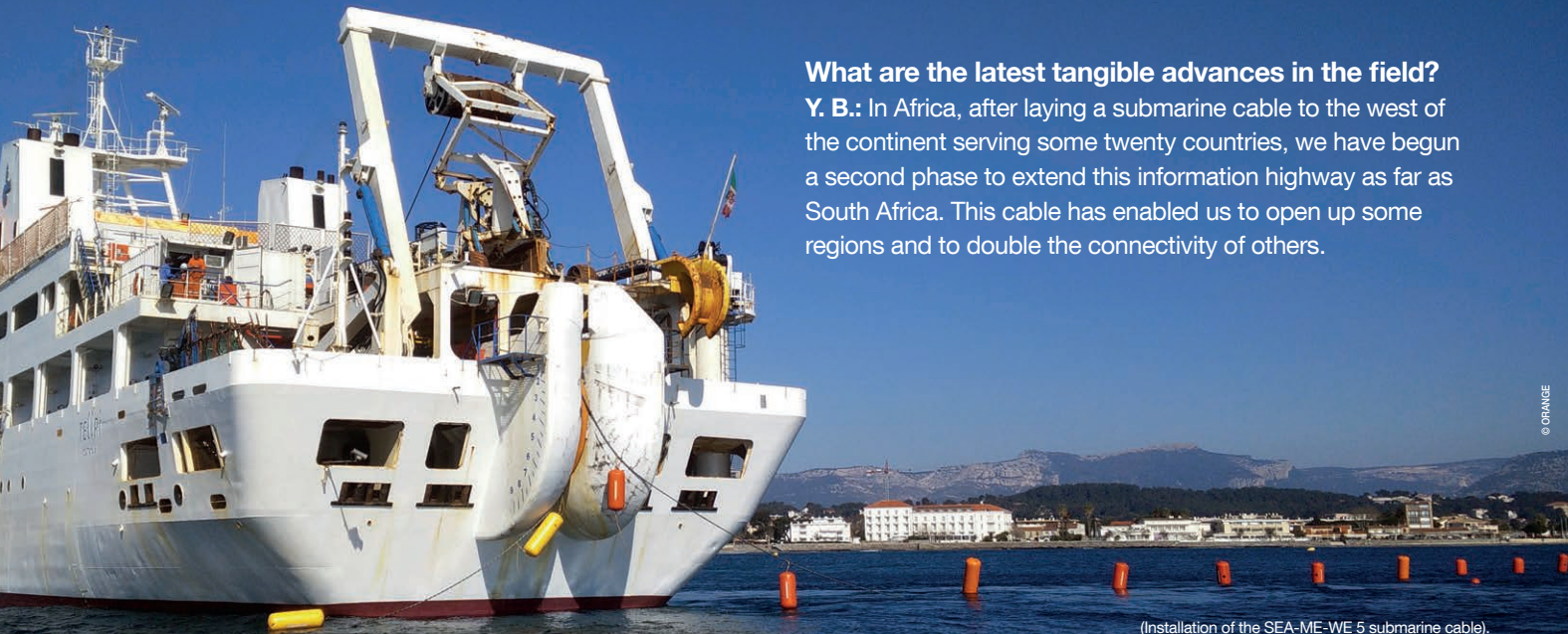**What progress has been made towards network coverage around the world?**

Yves Bellégo: Above 90% of global population are covered by 2G mobile but lots of areas remain to be covered in broadband. Whatever their country of origin, all companies now need to be linked to the world and cloud resources. International groups also want to be able to extend their business into remote areas without losing agility. We need to do a lot of work before we can implement these solutions.

What exactly needs to be done?

Y. B.: Although fiber optics, with strong growth in Europe, is still by far the most powerful technology we've got, we need to use complementary technologies to reach less-connected areas. Several areas are currently under study, including low-orbit satellites, new generation radio aerials and balloons. The future will probably consist of a combination of different technologies. One of the goals of 5G will be, in any case, to find an approach that bridges the areas with the best coverage and the most remote ones.

What are the latest tangible advances in the field?

Y. B.: In Africa, after laying a submarine cable to the west of the continent serving some twenty countries, we have begun a second phase to extend this information highway as far as South Africa. This cable has enabled us to open up some regions and to double the connectivity of others.

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(Installation of the SEA-ME-WE 5 submarine cable).

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