INTERNATIONAL CARRIERS' PATH TO THE IOT GOLD MINE

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INTRODUCTION

The Internet of Things (IoT) is potentially the most significant driver of new developments, technologies and revenue for telecom operators since the evolution of the Internet itself. Strong words, but the increasing opportunity to derive value from the collection and analysis of data from all the objects surrounding us is rapidly moving from a vague idea to a fully realized reality.

Although many white papers and articles have been written about the opportunities in transportation, healthcare, education and so on, much of the focus has been on the role that mobile operators will play in IoT. However, a significant part of the value chain for global IoT applications will require the involvement of International carriers, and little has been said about if and how these players should position themselves in this complex equation.

International carriers are at a turning point in their evolution, with many looking for solutions to move away from the basic voice and data transport functions, to re-invent themselves into high value solution providers and the aggressive support of IoT could be an integral part of this strategy.

This white paper therefore focuses on the different roles that International Carriers can play in IoT and what steps they need to take now to guarantee a future that is more than providing the bit pipe necessary to make things work under the covers.

THE LANDSCAPE

The IoT value chain is composed of 4 key components, each with its own set of opportunities and challenges: The device, the connectivity, the service enablement and the customer.

1. The device

All IOT applications start with the device which produces the event, which could be as simple as a status update all the way up to full motion video. These devices are composed of both smart components (SIMs, sensors, transponders) and smart objects (residential heating system, security system, healthcare devices as well as many objects involved in transportation - cars, trucks, trains, planes or ships). The wide range of use cases for these applications results in a rich set of requirements for the smart objects. Some will remain fixed in place for much of their lifetime, others will move both nationally and internationally. With our focus on the International IoT value chain however, all smart objects are assumed to be mobile at some point in time and will require to be accessed wherever they are. Additionally, the data they generate will need to be transported back to the data centers where it will be stored and analysed. Which brings us to the next element in the value chain: the connectivity.

2. The connectivity

Collecting data is a key part of the value chain. While mobile network based collection is a key element, some developments in low power wide area (LPWA) radio (both point to point and mesh approaches where the devices can reach another device that forwards the signals to other devices until a concentration point is reached) can offer a solution to fixed devices that cannot bear the cost of a dedicated GSM, LTE or even 5G radio system. In the case of global IoT support, however, a device will need to be accessed wherever it is and this will either take place via mobile networks, for easy to reach locations, or at the other end of the spectrum, via satellite based solutions to reach planes, ships and similar transport services.

With basic data collection in place, the data then needs to be transported to an environment where initial processing takes place. In a global or regional IoT environment, data will need to be transported internationally back to the cloud computing environment where the data can be stored and analysed and key alerts either processed and instructions returned to the device or forwarded to a central control center for human intervention.

This is where International carriers will initially see their main role and those carriers with a comprehensive global backbone will be well positioned to address this need. In addition, different types of data will require different types of transport quality and security. Carriers will therefore also have to be ready to offer class of service (CoS) treatment with Service Level Agreements (SLAs) tailored to each traffic type. Some more critical traffic will require low latency (emergencies in a car system for instance), while other traffic may just be 'I'm OK`' type information and require less immediate treatment. The need for low latency for data collection and rapid response will likely require a network of regionally based computing environments and international carriers are well positioned to provide these resources.

As we will explain later, international carriers will provide many of these services via their normal supply relationships for transmission services or roaming support, unless they take the initiative to broaden the scope of their connectivity service.

3. The service enablement

Once the data has been collected and transported back to a cloud computing environment, it then needs to be stored and statistically analysed firstly to immediately respond to the alert or issue if necessary and then to glean a deeper understanding of the problem or opportunity that comes from a broad Big Data approach to this mass of information. For example, applications to predict which components in a car are likely to fail in the near future would drive responses to warn the driver or to propose a service visit if time permits. Other analytics could be aimed at identifying opportunities for cost reduction in other industry verticals. All in all, this area is key to the value of the IOT chain.

System integrators, service providers and distributors will be involved in this phase of the value chain to support service provisioning, data and application management, data analytics and billing depending on the nature of the application.

In the case of a global IoT application, many of the necessary computing resources to support these activities could be operated in cloud computing environments hosted directly on the high capacity secure international networks operated by international carriers.
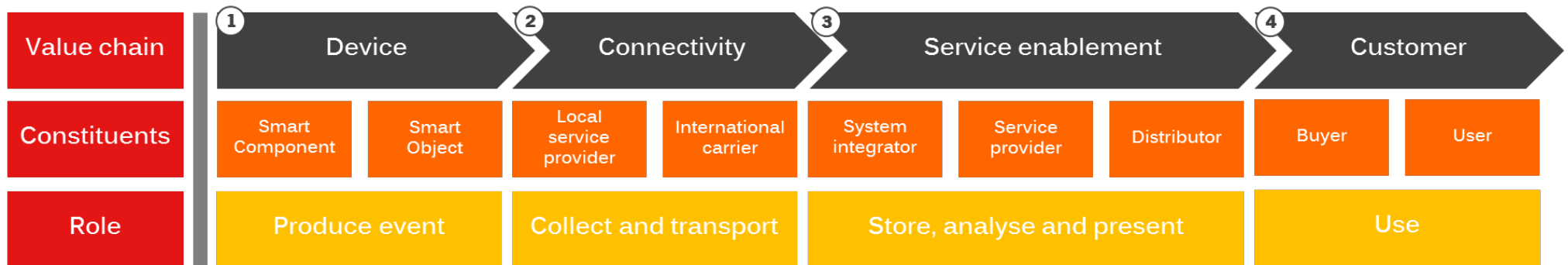
4. The customer

The final and most important part of the IoT value chain is the customer, which could range from the end user directly buying the service all the way to major multinational corporations. This variable will have a great impact on how the service is delivered, supported and billed. Also, considering the ever growing number of IoT applications, all participants in the value chain will need to be able to develop flexible infrastructure and business models that can easily be tailored for the varying needs of these customers.

One key underpinning change in this new connectivity landscape is the evolving nature of the customer/supplier relationship in the telecom industry, particularly in mobile. For much of its history, the relationship has been directly between the telecom service provider and the end user as customer. Of course, companies have concentrated their buying in some aspects, but the key purchase relationship has been direct from end user to the mobile service provider (MNOs or MVNOs).

In an IoT environment, the manufacturer of the smart object is most of the time the one interested in gathering data from the object. They are therefore likely to be the one establishing service and installing appropriate connectivity directly with the object and will therefore be the one owning the relationship with the end user – either directly or via their distributor arrangements. In those instances, the service provider offering the connectivity will be at least one step removed from the end-user relationship which will impact the type of support and billing it is expected to provide. The mobile customer relationship would therefore evolve from a B2C to a B2B2C type model.

Global IoT value chain

Value chain	① Device		② Connectivity		③ Service enablement			④ Customer	
Constituents	Smart Component	Smart Object	Local service provider	International carrier	System integrator	Service provider	Distributor	Buyer	User
Role	Produce event		Collect and transport		Store, analyse and present			Use	

POSSIBLE ROLES

With International carriers under constant pressure to find new sources of revenue, and with many looking to move away from the commodity business and beyond the role of a pipe provider, IoT may well be a way for some of them to achieve these goals.

We will now discuss the possible roles a carrier could play in the IoT environment and define the capabilities they would need to acquire to be able to operate at different levels of this value chain.

Possible levels of carrier involvement in IoT

International carriers can potentially choose from a number of approaches of increasing value in the world of global IoT applications as follows:

Level 1: Transport

International carriers already have extensive transborder (and some national) transmission networks and internet backbones. Many are building secure and private IPX networks for services that demand guarantees of throughput, latency or loss. They are therefore well positioned to play a key role in the International or regional transport component of the IoT value chain.

To achieve this level of support, carriers would not need to take any specific action, apart from ensuring they manage a well dimensioned regional or global resilient and adaptable backbone, which also offers CoS treatment to support different needs in terms of quality and security. In this case the IoT traffic would be transported as any other data traffic.

Carriers would either be the international transport provider for a mobile operator's customers (end-users or enterprises) or would partner with multiple mobile operators to provide the access and connectivity to a company in an appropriate industry vertical.

In that sense, international carriers who do nothing will gain some benefit from the spend on IoT. However it will be purely as a supplier of data transport in a competitive environment.

Level 2: Hosting

A growing number of carriers are building cloud and hosting capabilities over their International backbone. Capitalising on this new capability, carriers could move one level above the transport function to offer global cloud hosting to enterprises looking to securely access their IoT databases and applications (analytic software) from anywhere in the world. An IoT application located on a global carrier's IPX for example could offer this type of functionality with SLAs and security.

Again, this application is not necessarily new to many carriers, and would be seen only as another type of cloud hosting customer/vertical. For example, a company building a Europe-wide solution for an automotive company can approach the appropriate international carrier to establish the necessary transport requirement between countries and contract for data center and cloud computing resources to be centrally hosted over the carrier's cloud if needed.

Level 3: Local access

The next level of support could be the extension of the carriers' role to include local access .But how can an international carrier that has tended to focus on transborder issues compete in a space usually dominated by mobile operators?

Firstly, many international carriers have a much wider range of functions and capabilities in their group organization – some have multiple mobile networks, others are major internet backbone providers, still others have large consulting groups well used to developing proposals for multi-national corporations. A key starting point is to utilize all the resources of the group in establishing an end-to-end offering.

Beyond that, the next step would be to fill in gaps. It is hard to envisage being able to offer a full multi-national solution without full coverage for access to the objects in that region or globally. International carriers that

are part of a Mobile group are obviously at an advantage here, but no single mobile group has operations in all countries.

A possible solution to fill in this mobile access gap in a region would be to partner with, acquire or launch data MVNOs to provide the necessary local access to IoT devices. Some MVNOs already exist with this aim in mind and so a partnership or an acquisition could be quick ways of getting the access issues resolved for the international carrier.

As an interesting side development, making investments in some of the unregulated radio solutions could also be attractive. It is perhaps not clear if the service provider will install these or they will come pre-installed in the intelligent object, but having alternatives to expensive cellular connections could be advantageous.

With these steps in place, the international carrier would be able to propose a comprehensive solution of access, connectivity, data collection and simplification and, finally, secure cloud computing resources to a major manufacturer or to the industry vertical.

But one thing is certain, whatever level of support International carriers decide to offer in the IoT world, they will have to do so with security of the data in mind. In a world where security of the information is moving up in priority and complexity, security and fraud management at the transport, hosting or analytics level will be key.
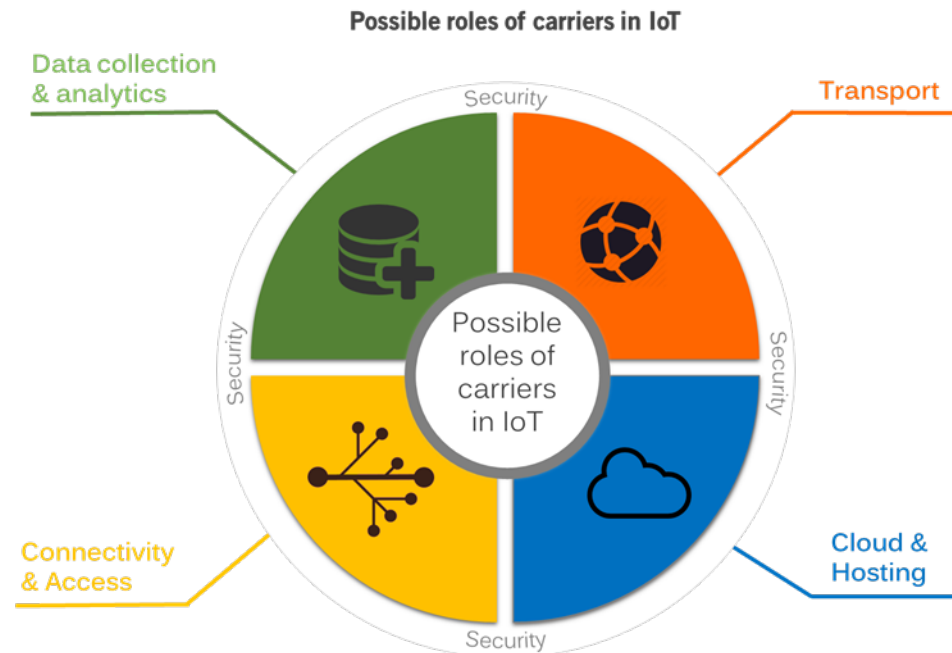
Level 4: Data collection and analysis (end-to-end offering)

The last piece of the puzzle for International carriers to be able to offer an end-to-end IoT offering to major corporations, and create an offering that encompasses all the elements of the IoT ecosystem to include data collection, device and data management, analytics and applications capability for the corporate customer.

Many of these advanced capabilities may already exist within a few of the International carriers who are part of a large group which also offers system integration, software development and consulting to enterprises for example. However for many International carriers, this would represent a brand new set of capabilities, for which they have little or no experience.

Realistically, International carriers who want to offer these services as part of their IoT bundle, would therefore need to either acquire or partner with system integrators, service providers and distributors to deliver the complete service enablement part of the IoT proposition, which is said to represent over 60% of the total revenue of the IoT value chain.

An international carrier able to provide all four levels of the IoT solution would indeed be in an ideal position to benefit from the growing gobal IoT opportunity.

Possible roles of carriers in IoT

Data collection & analytics

Security

Transport

Security

Security

Possible roles of carriers in IoT

Connectivity & Access

Security

Cloud & Hosting

Source: HOT TELECOM

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International carriers' IoT requirements and strategy summary table

Level of involvement	Role	Requirements	Possible strategy
Level 1	Transport	▪ Regional or global backbone ▪ IPX network to support CoS and security if required	▪ Establish service guarantees ▪ Investigate software based service deployment solutions
Level 2	Hosting	▪ Hosting capabilities	▪ Develop hosting capabilities over global International backbone
Level 3	Connectivity & Access	▪ Mobile local access globally or in specific regions	▪ Partner with mobile operators ▪ Partner with data MVNOs ▪ Acquire regional data MVNOs ▪ Use own mobile group reach
Level 4	Data collection and analytics	▪ Data collection capabilities ▪ Data analytics capabilities	▪ Partner with system integrators, service enablers and distributors ▪ Develop own capabilities

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OPPORTUNITIES

Again, staying with the focus on the international opportunities, we see market opportunities breaking down into three potential customer groups (as outlined in the diagram on page 14) with different needs and possible levels of involvement for International carriers: Consumers, Enterprises and Transport.

Consumer

The Consumer segment is undoubtedly going to be major, but equally, the majority of consumers do not spend much time outside their home country and so the opportunities for most international carriers are probably in support roles around travel. For instance, ensuring that health applications around the monitoring of implanted devices can be extended globally to whichever location the person happens to travel.

However, international carriers with a dominant domestic operator as part of their group could have a significant edge here. The domestic operator will have a direct retail relationship with consumers and the international arm can then extend those capabilities globally. It is difficult to envisage how an international carrier without such an extensive domestic set of relationships could build that relationship with an end-user even though that would be a very valuable piece of the jigsaw.

The range of consumer opportunities is broad, but will certainly include:

- Mobile devices
- Automotobile connectivity and entertainment
- Wearables, including fitness and health related devices
- Home security and control of environment

Enterprises

Providing services to Enterprises of all types and complexity is one of the key opportunities. International carriers can leverage their existing relationships and local presence to provide a multinational service platform offering a number of applications in the industrial and commercial sectors. For instance, multi-national corporations will require solutions to help them manage:

- Automotives – both maintenance, service and safety related as well as user applications enabled by the manufacturer
- Industrial machinery and production systems monitoring and repair management
- Agriculture sector where autonomous farm machinery is already being deployed and requires accurate positioning and advanced data collection to optimize food production
- Asset tracking across the entire supply chain
- Power and Energy infrastructure with high demands on safety as well as minimizing diversion of supply for fraudulent or illegal purposes
- Heating, Cooling and HVAC system monitoring and optimization across a regional deployment
- Mining Operations and the resultant supply chain for minerals and commodities

Transport

Finally, there is the transport segment, although this can overlap, in terms of the potential customer base with Enterprises. Transport here includes:

- Aircraft movement and optimization
- Shipping, particularly as part of an overall supply chain optimization
- Ferries and passenger vessels
- Trains – both passenger and freight

In the above segments, wholesalers can structure services to improve the value proposition for multinational corporations seeking to connect directly to their products and services to monitor performance, provide pre-emptive maintenance, reduce truck rolls, improve service levels, and enhance product design and functionality.
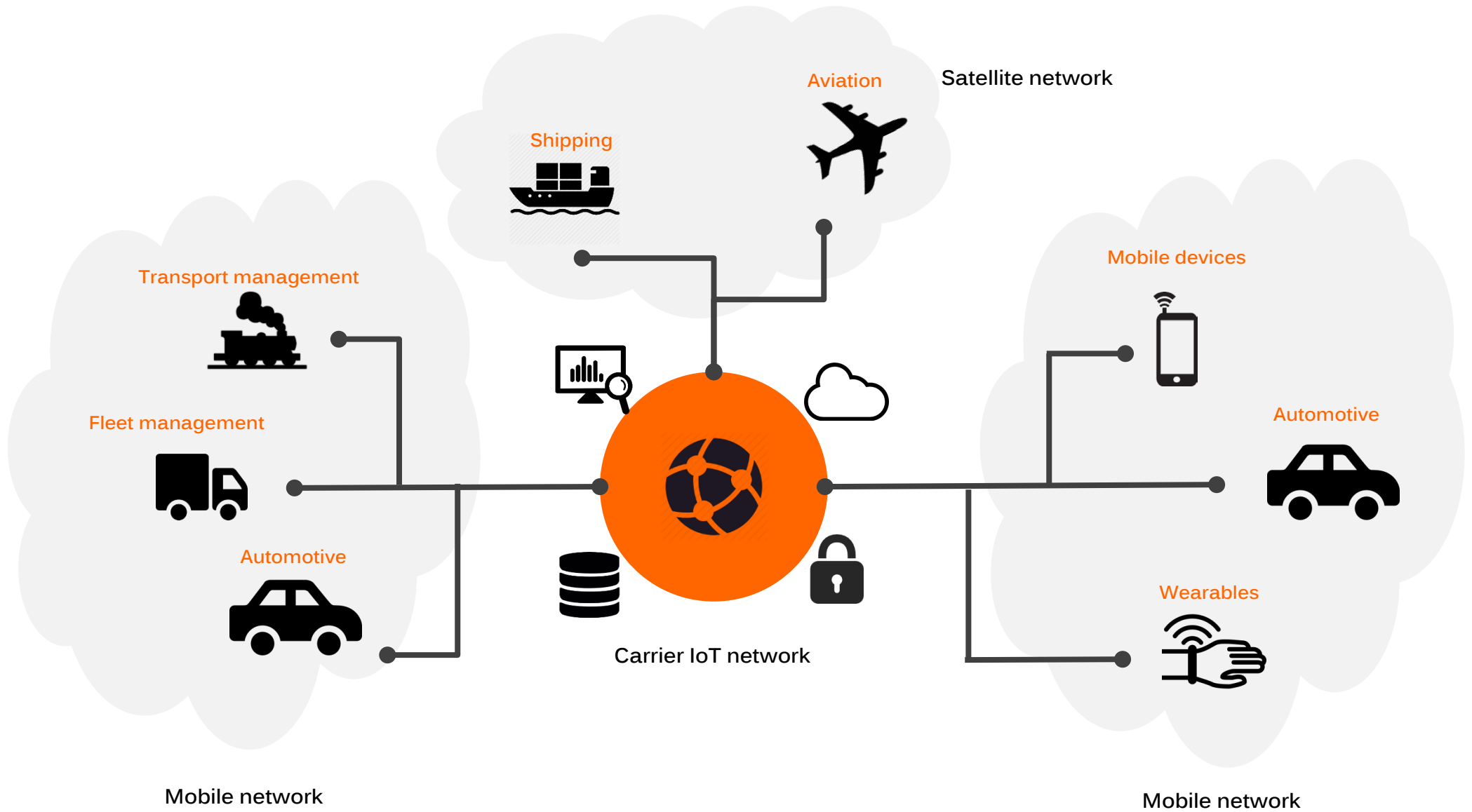
Real life examples

The market is at a relatively early stage for implementing such services. Yet, there are two examples that point to what the future may hold.

The first example is the new service by NTT Com that provides secure connectivity for IoT applications enabling corporations, for example, to monitor the operational status of exported machinery and vehicles and manage cross-border supply chains. These companies can now access, operate and manage connections that are not in the home network without having the need to sign multiple service contracts in each operational market.

The second example is an MVNO set up by Panasonic to provide connectivity to its business devices, such as a monitoring camera or a heating and cooling system. The service includes secure cloud storage for user data such as video.

These examples highlight the different opportunities where wholesale operators can play an important role in enabling IoT applications through a comprehensive service offering that includes connectivity, transport, cloud hosting and data analytic services that bridge different markets in a global marketplace.

Global IoT opportunities

Satellite network

Aviation

Shipping

Transport management

Fleet management

Automotive

Carrier IoT network

Mobile network

Mobile devices

Automotive

Wearables

Mobile network

Source: HOT TELECOM

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RECOMMENDATIONS

The time is ripe for International Carriers to be establishing their strategy to play in this new developing global infrastructure. To do nothing will relegate the carrier to a role as a provider of a commodity service – transport. The need to start planning now for the internal developments and acquisitions necessary to allow that provider to be a key enabling partner for the largest global companies is our key recommendation.

Thinking more broadly, we believe that carriers should be considering the following areas for investigation and investment:

Capitalize on your current global partnerships

One the most complex prerequisites is negotiating and closing with local players on country-specific connectivity partnerships and cloud hosting services, as well as navigating fragmented regulatory environments. Telecom wholesale operators are uniquely positioned to address the IoT needs of these enterprises by leveraging their existing partnerships with local MNOs, data center operators and managed service providers to offer a one-stop-shop for enterprise IoT solutions. The key is to start that process of investigation and establishing the necessary agreements and approaches to make it a smooth offering when the opportunities arise.

Investigate new wireless access technologies

We earlier discussed the potential establishment of IoT-centric MVNOs. These are expected to come to market in the next few years and would bundle different wireless access technologies – not only those based on 3GPP cellular technologies. These MVNOs would have optimized backend networks that match the requirements of the IoT service model and a go-to-market strategy that enables the IoT business case. LPWA is an example of emerging connectivity technologies that are specifically targeted at IoT applications characterized with intermittent, low throughput data transfer and longevity of field operation reaching up to 10 years on a single battery. LPWA technologies operate in the license-exempt spectrum and therefore are open to anyone to deploy those networks.
We recommend that carriers investigate new technologies in this space and also consider establishing an IoT-centric MVNO to broaden the

opportunity towards providing a full service access solution to major industries.

Data Analytics and Cloud Services

Finally, as enterprises and application providers evolve towards building and leveraging IoT based solutions, additional requirements emerge for data and application hosting, compute, storage and network access, and for the ability to manage and utilize IoT data. This is addressed through two ongoing developments that should be part of the planning and investment activities of international carriers interested in being a key part of these solutions:

a) The rapid introduction of NFV/SDN paradigms in the data center and progressively in the network fabric which allows the implementation of sophisticated cloud-based service creation and orchestration solutions for the enterprise and application provider customers.

b) The integration of big data management models on top of the cloud fabric allows a more efficient ingest and processing of the IoT generated data adding accurate predictive ability..

Conclusions

The opportunities for growth into higher value activities beyond international connectivity are extensive as the IoT requirements gain market traction. International carriers can successfully operate in this space and should start to build their business and investment strategy now to fully profit from the growth of this new segment.

THE AUTHORS

HOT TELECOM

HOT TELECOM is one of the most innovative telecom research and consulting companies in the industry. With its head office in Montreal - Canada, HOT TELECOM's team is composed of International telecom experts based in America, Europe and Asia, giving it a unique insight into the global telecom market. It has served 200+ of the industry's leading operators, consulting firms and governments globally, providing them with Telecom Analysis and reports, Training and Consulting services across a wide range of subject areas.

XONA Partners

Xona Partners is a boutique advisory services firm specialized in TMT. Xona was founded by a team of seasoned technologists and startup founders, and managing directors in global ventures. Drawing on its founders' cross functional expertise, Xona offers unique multi-disciplinary integrative technology, market and investment advisory services to private equity and venture funds andto technology corporations to generate additional revenues by developing new solutions and services.

Isabelle Paradis, President, HOT TELECOM
Isabelle has spent the last 20 years working with over 100 Tier-1, Tier-2 operators and wholesalers on all continents, looking at how to improve and launch innovative services. She has written many reports, white papers and articles on the evolution of the carrier world and has spent time looking at how telecom services are evolving, and what the future holds for the increasingly customer centric society.

Riad Hartani, Partner, Xona Partners
Riad has been involved in a string of technology startups in Silicon Valley as founder and key executive. His areas of expertise are in mobile communications, internet ecosystem, ad networks and artificial intelligence. Riad consulted with lead organizations in the US, Europe, Middle East and Asia. He holds a Doctorate and Post-doctorate in Computer Science from the University of Paris and the University of California, Berkeley, and completed the Executive Education in Business at Stanford Graduate School of Business.

Steve Heap, CTO, HOT TELECOM
Steve has a lifetime of experience in designing, engineering and operating networks, both domestic and international. With leadership experience in small technology start-ups through to global service providers, he has deep experience in a wide range of products, technologies and geographies. He has the rare skill of being able to explain complex technical issues in easily understood concepts.

Frank Rayal, Partner, Xona Partners
Frank spent over 20 years working with system vendors and mobile network operators on bridging the technology and market divide to define and launch new wireless solutions. He is the author of several market research reports on NFV in radio access networks and small cells, and has written extensively on various industry topics. Frank advises investors and corporations on emerging technologies, markets and go-to-market strategies.

For more information contact:

HOT TELECOM
t: +1 514 270 1636
f: +1 215 701 7537
e: info@hottelecom.com
w: www.hottelecom.com

Xona Partners
t: +1 613 600 4400
f: +1 416 969 9570
e: advisors@xonapartners.com
w: www.xonapartners.com