

# The Future of Telecom: A Dual Transformation

Amid technological, regulatory, and customer changes, the industry has focused on consolidation. But long-term, sustainable growth will require new network platforms and capabilities that meet unique customer needs related to “Internet of Things” services

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By Patrick Viguerie, Keith Cowan, and Brian Hindo

**Patrick Viguerie** is President of Innosight, where he advises clients on new strategies for growth; he has more than 20 years of experience consulting to telecom companies across the value chain.

[pviguerie@innosight.com](mailto:pviguerie@innosight.com)

**Keith Cowan** is a Senior Advisor to Innosight, with 20 years of experience as head of strategic planning and corporate development at Sprint and BellSouth; as chairman of Venadar LLC, he now delivers corporate development support services to Fortune 500 clients seeking to invest in growth and disruption

[kcowan@venadar.com](mailto:kcowan@venadar.com)

**Brian Hindo** is a Principal at Innosight, where he helps companies develop innovation and growth strategies in uncertain environments

[bhindo@innosight.com](mailto:bhindo@innosight.com)

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## EXECUTIVE SUMMARY

The level of future uncertainty is increasing around the telecommunications industry – driven by rapid technological, regulatory, and customer demand changes. Still, the opportunities are greater today than ever before for industry players that embrace disruption, reimagine their network services capabilities, and drive growth. We believe that every major participant in the telecom industry in the U.S. – including AT&T, Verizon, Sprint, T-Mobile, Comcast, Charter, CenturyLink, and Dish – must immediately embark on a customer-focused dual transformation. The first transformation is the redesign of today’s core network business as a “customer trust network” that maximizes its resilience while simultaneously supporting its ability to offer bespoke, carrier-grade services. The second transformation is the creation of specialized growth engines that leverage the restructured core business to deliver tailored network services – “networks as a service” – to meet emerging public, private enterprise, consumer, and wholesale customer needs.

To get a glimpse of what the “future of telecom” (the “FoT”) could look like, we point to the potential capabilities of 5G wireless technologies, and the planned buildout of the FirstNet carrier-grade public safety network, along with the rapidly evolving customer needs relating to “Internet of Things” (“IoT”) services and service models.

Instead of focusing on this potential growth, most industry analysts are focused on achieving market equilibrium (at no or low growth) through industry consolidation. Witness the flurry of activity and rumors around horizontal consolidation (Sprint and T-Mobile), cross network platform consolidation (Verizon and Charter; Sprint and Charter; or Sprint/TMUS/Comcast/ Charter), and vertical acquisitions (AT&T and Time Warner). Similarly, most financial analysts are focused on the sustainability of dividend payments and the ability to refinance debt on favorable terms, as the two most important support mechanisms for the current valuations of telecom companies.

We acknowledge the economic pressure to consolidate and the need to drive cash flow to cover dividend obligations, debt payments, and pension obligations, but we believe that a focus on investment in real growth is even more of an imperative. Carriers have an immediate – but not indefinite – opportunity to energize growth through the development of carrier-grade and virtual network services that can be offered to emerging customer segments that require specialized, and often bespoke, services. This services-based strategy also represents a way for U.S.-based telcos to grow beyond the physical asset platform that has constrained them largely to a narrow geographic focus; likewise, this strategy offers growth opportunities for incumbents in other markets that need both market growth and expansion opportunities.

If incumbent carriers fail to do so, then non-carrier service providers and systems integrators will continue to fill the void, fulfilling customer needs and creating enormous value by offering virtual network functionality that rides on the carriers’ “dumb” pipes and “best efforts” services<sup>1</sup>.

Innosight specializes in assisting clients in determining the path of the client’s unique dual transformation, in allocating resources necessary to execute such transformations, and in the formation of growth engines by identifying and helping its clients to understand, collaborate with or acquire innovators and disruptors.

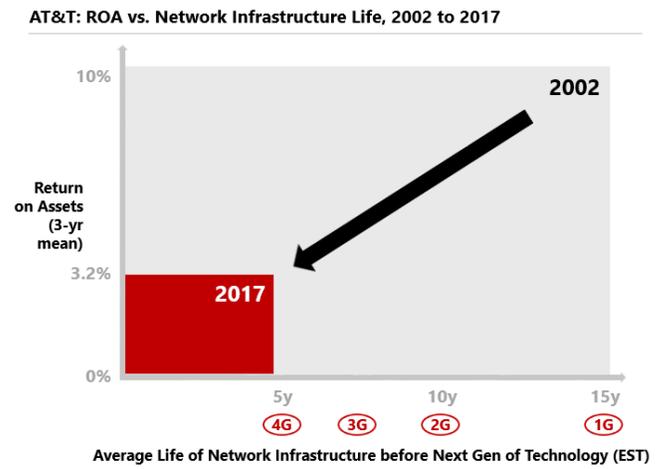
**I. THE CASE FOR CHANGE**

When corporate leaders talk about transformation, they often mean doing what they are currently doing better, faster, and cheaper. That is a recipe for short-term survival, but not long-term sustainability, and certainly not long-term growth. In the telecom industry, companies are spending more than ever – \$56 billion in capital expenditures in 2016 – while enjoying lower returns as subsequent generations of standards and technologies depreciate at an accelerating pace (see figure 1).

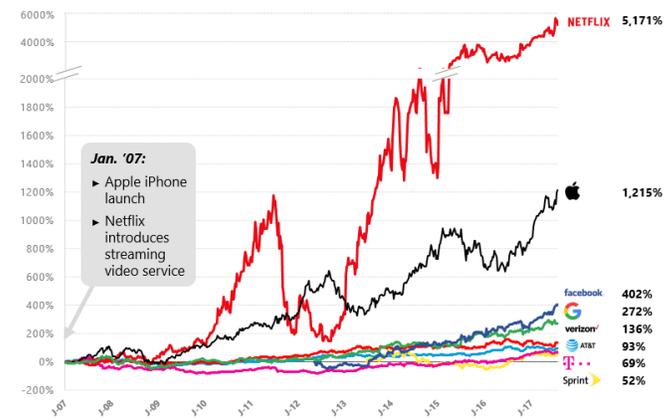
In the meantime, upstarts across industries old and new are using telecom network infrastructure to develop novel value-added products and services, often wrapped in new business models. And they are getting massively rewarded by the market (see figure 2). This is what it looks like when an industry is being disrupted.

In the face of such disruptive threats, carriers, or “telcos,” have sought greater efficiency through industry consolidation. The industry is chaotically structured, with

**Figure 1: Declining Returns**  
Telcos are getting less return on assets as network infrastructure lifespan shortens



**Figure 2: What Is Tripping Up Telcos?**  
Major Telcos Cumulative TSR vs. “FANG” Companies, 2007-2017  
Index: 2007=0



<sup>1</sup>It is important to distinguish between a “network provider” (or “carrier”) and a “communications company”. Arguably, a network provider is responsible for the performance of the physical network (hardening, spectrum allocation, bandwidth, speed, latency, downtime, message prioritization, some security, etc.) while a communications company (the “FAANG” group and others – Facebook, Amazon, Apple, Netflix and Google) have increasing responsibility for the delivery, and protection, of digital content. This distinction is important when we get to a discussion of the creation of a “Trust Network” below and needed collaboration.

four primary wireless carriers, and several potential “want-to-be wireless carriers” like Dish and “need-to-be-carriers” like Comcast, Charter and CenturyLink. Guided by the “Rule of Three,”<sup>2</sup> discussions among various players (which kickstarted with Sprint and T-Mobile as far back 2010, misfired with AT&T’s attempted acquisition of T-Mobile, and persist today with rumors involving virtually all the wireless, cable and satellite companies) will continue to attract industry time and attention, although AT&T has likely played itself out of further telco-focused consolidation and will likely continue down the path of vertical consolidation.

But by itself, additional consolidation resulting in “bigger, better, faster, and cheaper” simply isn’t enough for telcos. Consolidation cost synergies are always a temporary fix. No matter how big the dinosaur, the asteroid is already on its way.

What’s needed is a double-barreled response, or what Innosight calls a “dual transformation” – a systematic approach we’ve developed over the past 15 years, helping large companies respond to disruptions in their industries. The first transformation is to reposition today’s core network business to maximize its resilience and increase its capabilities. The second is to create new growth engines, often through targeted investments and acquisitions. Dual transformation is not about unrelated diversification, or simply about using the cash generated from “A” to invest in speculative new ideas. Rather, it is finding ways to use unique capabilities to compete in new ways that no upstart can possibly match.

## **II. A HISTORY OF INDUSTRY TRANSFORMATION**

The telecom industry has arguably gone through multiple transformations over the past 40 years. In the 1980s and 90s, following deregulation and the breakdown of carriers into local and long-distance providers over primarily copper facilities, there was a period of great growth. The “Baby Bells” reaped the benefits of massive inter-segment leverage – the ability to monetize similar investments in assets and services across consumer, business, and wholesale markets. The Baby Bells also integrated value-added services, such as caller ID and screening, call transfers, and three-party calling, and pushed through “second-line” sales to consumers over copper infrastructure already in place.

With new technology developments (e.g. fiber optics, internet protocols, processing speeds, chip enhancements, etc.), carriers deftly moved to reduce the cost and improve the quality of landline services, moved from circuit switched to internet protocols, moved from narrowband to broadband, and, most importantly, moved from landline to primarily wireless last-mile connectivity.

This wireless transformation was led by the consolidators of the Baby Bells plus two wireless upstarts, Sprint and T-Mobile (itself a consolidation of GSM providers). This shift was hastened by dramatic shifts in consumer behavior, with the exponential growth of adoption of smartphones, tablets, and other devices – and now with massive amounts of video being streamed over wireless networks.

The convergence of networks, storage and processing power have enabled the burgeoning of the “Internet of Things,” in which business models for the delivery of everything from books to the management of transportation are disrupted by the convergence of wireless connectivity, hardware, software, cloud services, data analytics and artificial intelligence.

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<sup>2</sup> In the book, *Rule of Three*, Emory professor Jagdish Sheth argues that, as a rule of thumb in competitive industries, the top three players typically control 70% to 90% of a market. It is an argument that illustrates the economics of industry consolidation and has historically been influential in the telecom space

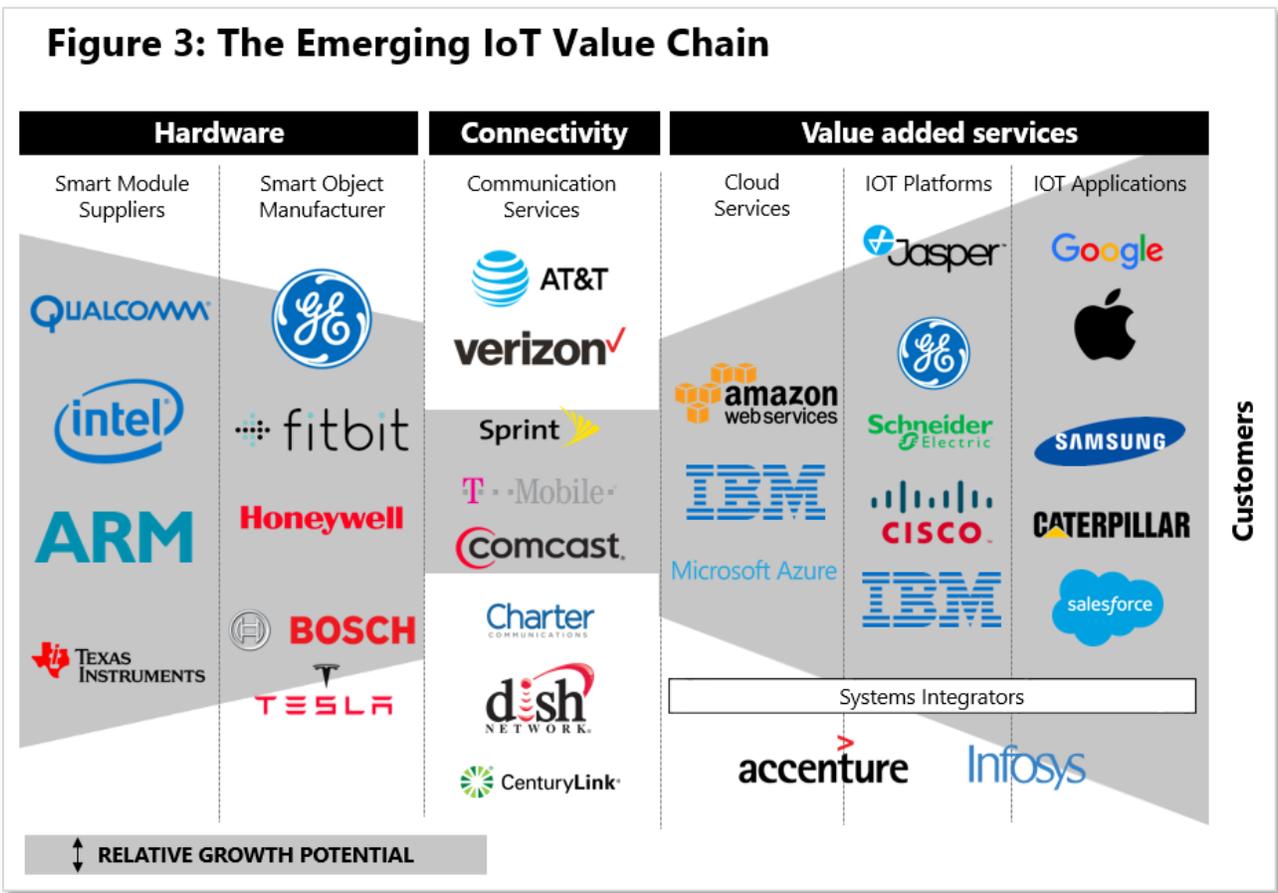
### III. THE CURRENT ERA: DISINTERMEDIATION

Despite leading the charge and enabling the wireless transformation, carriers have since been left behind – behind on growth, behind on innovation, and at great risk of disruption – all while burdened with enormous capex requirements, staggering debt loads, and many with increasingly unmanageable dividend obligations.

Why? Simply put, once consumers had the iPhone and other smart devices, the new providers of intelligent, value added services disintermediated the customers from the carrier providing connectivity.

In addition, as services went from landline to wireless, customers were willing to trade newfound freedom and flexibility for a lower quality of connectivity. The carriers, once off the hook for providing trusted and reliable services (“six-nines” services), and in part thanks to the perceived restrictions (or excuses) of “network neutrality,” also gave up trying to innovate and provide new value-added network services (e.g. increased security, hardened networks, variable bandwidth, lowered latency, connection prioritization, use of blockchain protocols, etc.).<sup>3</sup>

Now, while network connectivity is a critical piece of the value chain emerging around the “Internet of Things”, the lion’s share of the value is still accruing to other nodes of the value chain – most dramatically, the application layer directly connected to the customer (see figure 3). Furthermore, startups are attracting huge amounts of capital investment, at both ends of the IoT value chain, which will continue to drive further growth and disruption.



<sup>3</sup> Landline carriers understood that services levels for voice services had to be “class six” or six - nines reliability, meaning that service had to be delivered without interruptions 99.9999% of the time; meanwhile, wireless customers willing traded the joy of mobility and lack of tethered communications for poor coverage, dropped calls, garbled communications, jittery data communications, etc.

#### IV. TRANSFORMATION A: BUILDING A CARRIER GRADE 'CUSTOMER TRUST NETWORK'

To regain relevance and customer trust, both an industry restructuring and a dual transformation are required. Here's what that could look like.

First, to halt the continued commoditization of their networks, telcos must transform their core business. Rather than creating a one-size-fits-all, "best efforts" network that customers will pay increasingly less for, telcos need to consider what underlying needs – or jobs to be done – customers really have. With that understanding, then they should build (and charge for) "carrier grade" networks with the right performance dimensions to satisfy those jobs for the right types of customers in the right end applications. Depending on the application, networks can be hardened and tailored to maximize security, resiliency, throughput and signal prioritization, while minimizing interference, latency, jitter and error rate. And carriers can push upmarket – where opportunity for growth, margin, and differentiation still exist – by offering bespoke "trust network" services.

More specifically, a "Trust Network" must be created with four semi-distinct levels. Also, carriers must bring unparalleled depth and breadth to each layer of new-and-improved, API-enabled applications (also referred to as "virtual network services"). The layers of the Trust model include:

1. **Privacy and Security:** military-grade cryptography and identity management techniques ensuring the highest level of information transfer and communications and transaction integrity
2. **Confidence:** proven and branded certification and attestations, deposited within a common distributed ledger (such as a permissioned block chain), affording demonstrably incorruptible and immutable records
3. **Control:** certified self-sovereign identities, enabling irrefutable fine-grained permissions, could invert the authorization model to the data recipient; and the resulting transparent provenance of protected information will facilitate its flow
4. **Engagement Support:** support for a proliferation of innovative new applications, possibly secured, that will enable bringing needed new cost-curve-bending, outcome-driven, compliant and customer pleasing solutions to market.

It is important to keep in mind that a new level of carrier commercial cooperation may be required to deliver a "Trust Network" to customers. The internet first emerged as a "network of networks" to provide global reachability through peering (a voluntary interconnection of administratively separate internet networks for the purpose of exchanging traffic between the users of each network). The purest definition of peering was settlement-free, "bill-and-keep," meaning that neither carrier paid the other in association with the exchange of traffic; instead, each derived and retained revenue from its own customers. Peering was instantiated by a physical interconnection of the networks, an exchange of routing information through the Border Gateway Protocol (BGP) routing protocol, but rarely pursuant to a formalized contractual document. As carriers seek to construct and offer the services of a global "Trust Network", it is highly likely that increasingly formalized network interoperability agreements will be required to provide carrier-grade (rather than "best efforts") connectivity.

Furthermore, from a carrier provider standpoint, a new operations model will need to emerge whereby network operating centers, or NOCs, are replaced with actual or virtual or AI-driven service operating centers, or SOCs. These SOCs would focus on correlating customer service commitments with actual network performance. They would be supported by performance threshold alerts, network element fault alarms, and could probe data to quickly locate issues and prioritize workloads.

In turn, these service commitments working with SOCs – especially if regulators abandon network neutrality – will enable the emergence of vertical market services that require security and extraordinary performance, such as near-zero levels of latency. From here, new growth opportunities will arise – the “Transformation B” described below.

By transforming their core network business model through a renewed focus on customer jobs to be done, telcos can once again position themselves to deliver trusted, value-added services to customers in specific vertical markets and industries. This is a necessary step to ensure continued relevance – but insufficient on its own to drive sustainable long-term growth.

**V. TRANSFORMATION B: CREATING NEW SERVICES BUSINESS MODELS AS ENGINES OF GROWTH**

The second transformation, or “Transformation B”, is to create new telecom services supporting new business models that leverage these enhanced core capabilities.

Identifying these opportunities requires a mix of analytical thinking – where would connected and protected applications benefit from ‘made-to-measure’ networks? – and creativity – what is possible given advances in critical enabling technologies?

We’ve laid out three potential applications here that illustrate the need for bespoke telecom services:

**Figure 4: Networks-as-a-Service in the IoT Value Chain**

Below are three circumstances in which connected applications will demand faster, more reliable, and secure networks. Rather than solely operate wireless networks, telecom carriers should seek to position themselves to capture value from the entire IoT value chain via network-driven services - especially in time for the 5G transition.



**ADAPTIVE TRAFFIC CONTROL**

Adaptive traffic control entails traffic lights that adapt based on traffic demands derived from input of nearby connected cars and larger-scale traffic grid data. It demands...

- Low Device Power
- Low Latency
- High Throughput / Connection

**Telcos could develop network analytic services in addition to enabling connected objects:**

- How can telcos optimize and recommend routes to minimize traffic via traffic big data?
- How can telcos enable traffic systems to become wireless?
- How can telcos share wider-range traffic data to program local traffic lights?



**REMOTE SURGERY**

Telesurgery is performed by a doctor via medical robotics, where the patient can be as far as a few time zones away (e.g. a wounded soldier). Such a process requires...

- Extremely Low Latency
- High Bandwidth Density
- High Throughput / Connection

**Telcos could offer exclusive, dedicated networks for niche tasks that demand privacy & security:**

- How can telcos provide encryption services to stop malicious activity?
- How can telcos guarantee stable connections in the event of unexpected events like blackouts?
- How can telcos transmit vital, sensitive patient information efficiently to doctors?



**HD AERIAL IMAGING**

HD Aerial Imaging can help replace current satellite imaging and also provide surveillance of and access to important geographies such as borders or disaster sites. It needs...

- High Connection Density
- High Throughput / Connection
- Low Device Power

**Telcos could create new products and services that take advantage of their low-to-zero network costs:**

- How can telcos play in areas such as geomapping & surveillance?
- How can telcos identify synergistic products that currently have high network-use costs?
- How can telcos offer services that address current mobile consumer jobs? (e.g. drone selfie?)

Increasingly, enterprises and institutions again will demand specialized network services that are delivered by virtual network functionality (NFVs) built on a core, carrier grade network. Will the existing carriers step up to meet the customer requirements with a "network as a service" strategy?

And how will carriers identify the customer opportunities? The answer is easy – just by watching for the words "smart" or "connected" in connection with "customer" and the "IoT". For example, opportunities are already presenting themselves to serve defined service areas like smart cities, smart highways, smart hospitals, smart factories, smart offices, and smart homes. Similarly, "connected" service opportunities exist for everything from connected vehicles to connected airplanes and drones to connected physicians to connected customers. Lastly, there are various flavors of the emerging enterprise IoT, ranging from the "IIoT" (the "industrial internet of things") to the "EIoT" (the energy internet of things) to the "RIoT" (the "retail internet of things").

Already, we have seen the emergence of at least one such bespoke network to serve public safety and first responders. FirstNet, as an independent authority within the U.S. Commerce Department (NTIA), is the designer of a new network for public safety and first responders, which require very specific performance criteria. The requirements included coverage; a hardened network; dedicated radio spectrum, reliability, resiliency and redundancy; priority access to the network; throughput; group communications; specialized solutions; and a portfolio of devices.

Uniquely, to support the development of this network and supporting services, the federal government provided 20MHz of 700 MHz spectrum and success-based funding of \$6.5 billion. AT&T was the winning bidder, and is leveraging its existing network infrastructure to meet the specific requirements of the "public safety network" (and in so doing, may be executing on much of a "Transformation A" agenda). Interestingly, Verizon, and startups, like Rivada, are now pursuing public service customers with specialty "virtual network" services that can function over the existing networks, and which meet the some, but not all, of the public service requirements. What will be more interesting is to watch to see if AT&T offers premium FirstNet services to other customer segments, such as residents of Florida, Texas, and other hurricane-susceptible areas, or prioritized group messaging for utility companies that need to respond to power network outages.

A further opportunity to provide bespoke services will emerge with 5th generation wireless systems ("5G"). While the deployment of 5G networks may require new spectrum bands (including the 28 GHz, 37 GHz and 39 GHz bands), and a massive network "densification" effort through the creation and connection of thousands of new micro- and pico-cell towers, the 5G standards promise increased data rates, hundreds of thousands of simultaneous connections for wireless sensors, enhanced spectral and signaling efficiency and significantly reduced latency. Carriers also will need to collaborate to accelerate the development and deployment of chips, circuit boards, antennas with phased arrays and other technologies that can steer signals around interference, accelerate refresh rates, and minimize signal loss and energy consumption. They also must further develop partnerships that utilize the latest in software-defined networking and network functions virtualization to better predict, detect, and respond to cyberattacks.

Indeed, for telcos, the window of opportunity is open – but it won't be open forever. A decade ago, a massive shift from on-premise IT services to cloud computing first took root. Since then, cloud services have laid the foundation for profound economic transformation. The "network as a service" model has similar transformational potential. Will incumbent telcos rise to the challenge? Or as in cloud services, will we see new players or other, nimbler existing players such as Salesforce or Google dominate the space?

It's not going to be easy. As in the FirstNet example, delivering these "network as a service" capabilities may require collaborative efforts with both carriers and non-carrier communications providers of virtual network services. For example, Dish Networks has spectrum and has expressed a desire to create a carrier grade IoT network (to support

drones, autonomous vehicles, robots, and the like). Could Dish, perhaps with Google or Amazon, partner with Verizon in a manner similar to the FirstNet collaboration?

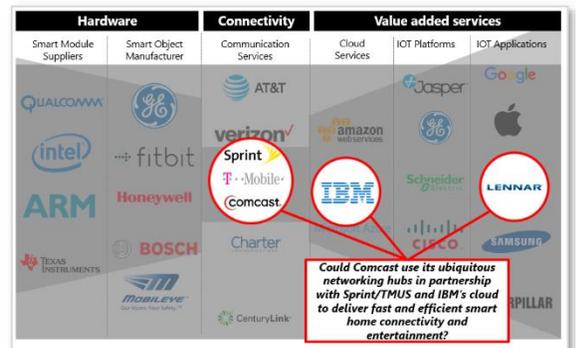
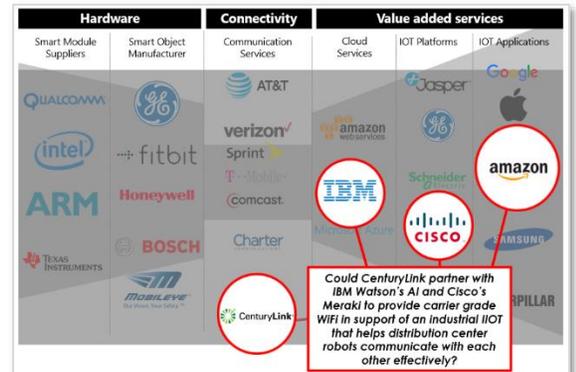
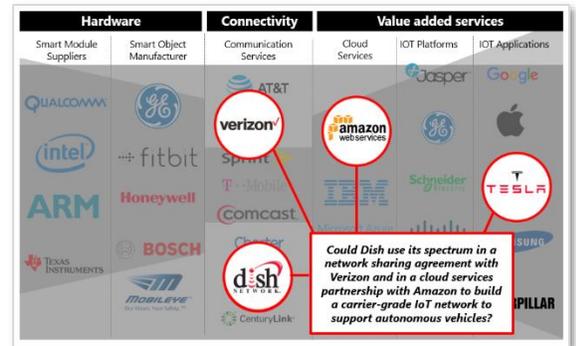
Would Sprint and/or T-Mobile, perhaps partnering with Comcast and Charter, along with Microsoft, consider offering specialized telecom services that support smart homes with home entertainment, educational, security and operations system that offers VR and AR entertainment content and gaming, home educational services, full video security, robotic management, temperature, lighting and cooking controls, and home logistics functionality?

Perhaps CenturyLink, with its network and data hosting (“cloud services”) centers, would partner with IBM Watson, and its artificial intelligence capabilities, and Cisco Meraki, to provide carrier grade WiFi in support of an industrial Internet of Things (“IIoT”) that helps our factories and distribution centers to run safely and efficiently?

The potential opportunities for collaboration are unlimited. And in addition to collaborations with large scale, non-carrier communications providers, the carriers will need to dig deeper to find and partner with or invest in smaller, entrepreneurial companies that are developing growth businesses around connected objects.

This type of strategy is qualitatively different than vertical integration such as AT&T’s proposed deal for Time Warner and Verizon’s acquisitions of AOL and Yahoo. Those have their place, too, as the acquired content providers rely on network connectivity to power and position their offerings.

Yet the “networks as a service” approach differs in that the telco’s core network assets are inherently integrated into a novel value proposition from the outset. That creates truly sustainable differentiation and a competitive advantage it can wield over competitors, startup or otherwise.

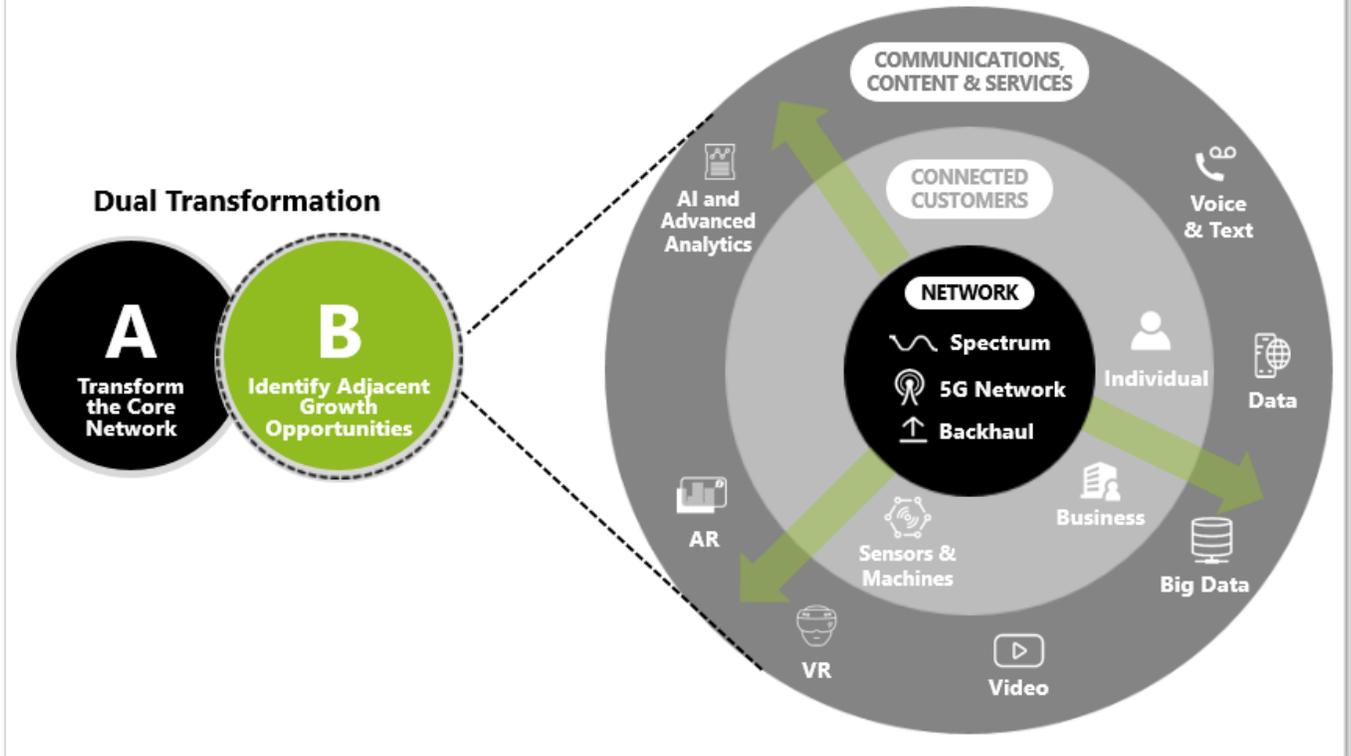


**VI. THE STRATEGIC IMPERATIVE FOR TELECOM**

It is time for a dual transformation in telecom. Network organizations must use the unique assets and capabilities of their carrier to design and build their version of “trust” capabilities, and be positioned to offer those services on a bespoke basis to their customers. Product teams must support their sales organizations by working to meet public entity, private enterprise, consumer and wholesale customer needs in the smart, connected, and IoT worlds. Perhaps of equal importance, corporate and business development teams must develop collaborative partnerships and make investments in or acquisitions in disruptive and emerging growth companies who have necessary hardware and the right customer-facing applications and capabilities.

### Figure 5: Transformation B Begins With Adjacent Opportunities

In order to drive growth (the "B" in the dual transformation), carriers must become the "center ring master", driving collaborative new business models and partnerships with hardware, software, cloud services, data analytics and AI providers, while searching emerging growth markets for companies with disruptive new services and products



*Can carriers transform the core network to be the "trusted" partner in the ecosystem?*

*Can carriers use this customer trust position to move to the "center of the ecosystem" and be the leading integrator of hardware and value-added services, to create "networks as a service" offerings for customers?*

*Will carriers invest in the development and deployment in the next generation of disruptive and emerging growth capabilities? In doing so, can they get ahead of the FAANG companies?*