



State of the Art Packet and  
Optical Networking



## 5G Ushering in an API Economy

## The 5G Promise

5G has been the industry's 'darling' for the last few years. And for good reason. News of spectrum bids and 5G trials come at us from every angle. After years of declining growth and slipping margins, many are holding on to the hope of a 'new dawn' one which will lead to immense growth and kick-start the latest cycle in telco investments.

But 5G is not just another G, or at least it shouldn't be. It can be more than simply faster speeds and additional traffic. 5G holds the dual promise of unprecedented services and unparalleled user experience. Whereas the transition from 3G to 4G was a mere 'baby step' in evolutionary terms, the transition to 5G will need to be different. In fact, to truly exploit the full potential of 5G will require a 'giant leap' in every sense. And with it, the potential to offer a vast array of new telecoms services to individuals, businesses, enterprises and mission-critical industries.

But the path to the 'Promised Land' will be no bed of roses. To ensure service providers meet the ROI expected of them, they would do well to consider not only 5G use cases and their network investments, but also their business models. Examining these with an eye on their core strengths and capabilities will likely lead to better decisions and ensure short and long-term revenues.

## 2023 and Beyond: Where 5G is Taking the Network



Number of cellular IoT connections to reach **3.5 Billion** by 2023



5G infrastructure spend to reach **\$26B** by 2022



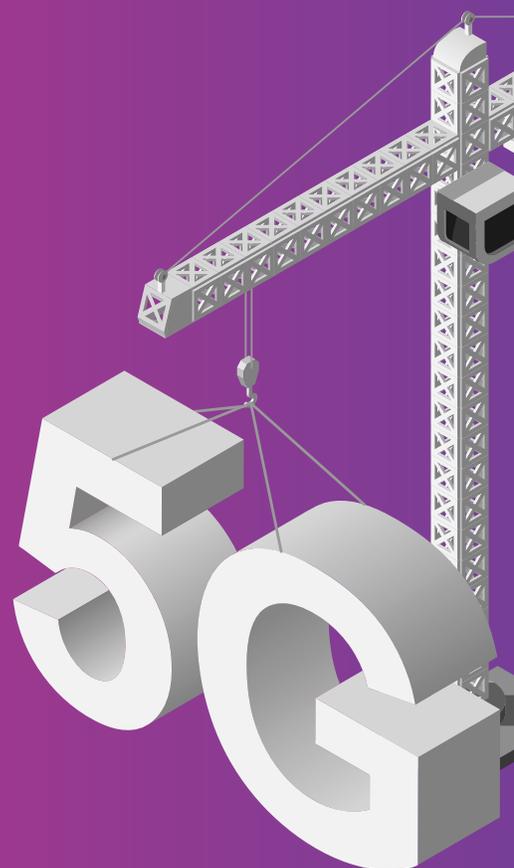
Download speeds to reach **1-10 Gbps**



Mobile Data traffic to reach **107 EB** per month by 2023



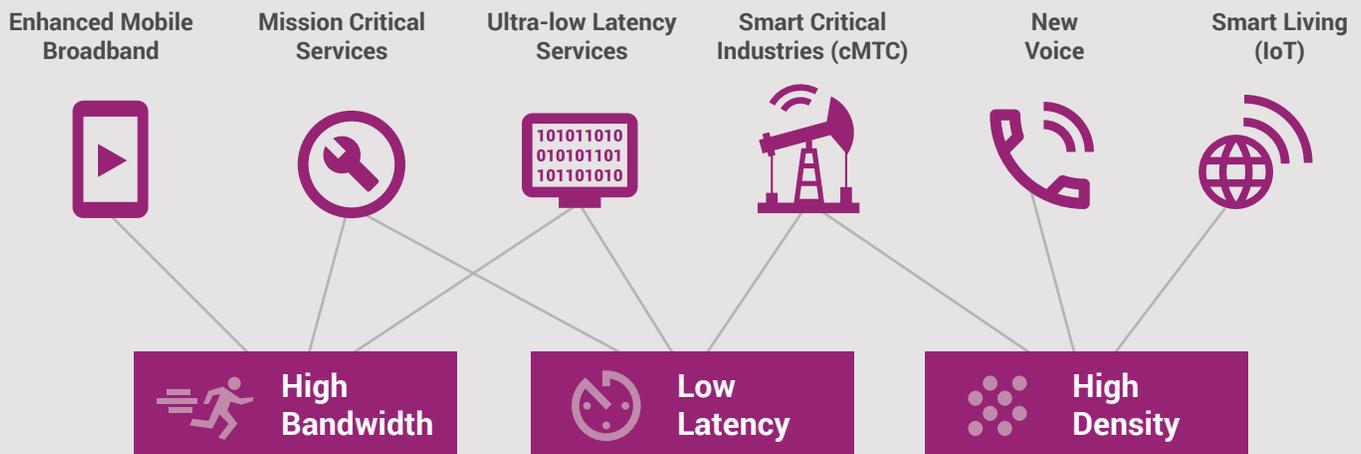
Mobile subscriptions will reach **8.9 Billion** with smartphone subscriptions to reach **7.2 Billion** by 2023



### 5G: It's All About the Services

What truly separates 5G from its predecessors are the services. 5G will usher in the trends of tomorrow, like inter-carrier service delivery, massive machine type communications, remote surgery and autonomous vehicles. And this is just the beginning. Whereas today, nearly 100EB of data is transported on any given month, 5G and billions of connected devices will fuel exponential growth.

Services will need to be defined, and SLA profiles fed into the networks. To ensure we are meeting the mark, networks will need to progress beyond today's over-provisioned, over-engineered, 'college try'. Networks will need to assure SLAs are being met proactively, because otherwise 'real-time may hit a time warp' and those autonomous vehicles may hit each other (or something else). Those deterministic, TDM-like services of old will experience a comeback as 'mission-critical' garners new meaning.



'Virtually slicing' the network (often referred to as network slicing) is the only feasible way to accomplish this. And while everyone is talking about network slicing, the path to network slicing is far from being defined. What is clear is that networks will require a fully integrated, programmable transport layer, composed of both packet and optical capabilities. Service-oriented, operations software will provide the intent-driven linkage between the service requests coming from the orchestration layer and the configuration required in the transport layer. Proactively ensuring the services delivered across the network meet the service parameters and policies is, indeed, a great departure from today's rigid, manual networks.

### The Lack of a Clearly Defined Business Case

So, in order to fulfill 5G's true potential, carriers will need to invest massively. Not only in procuring new spectrum and new radio, but also in the network itself. With the massive investment required, ROI is key – unfortunately, another point of ambiguity is the 5G business case. Yet, in spite of the uncertainty, operators will have no choice but to invest due to the increasingly commoditized and competitive landscape.

Enhanced Mobile Broadband (eMBB) services are likely to be the first 5G services to launch. Yet in the long run, consumers will not pay more for bigger and faster. There is no doubt we will initially see more expensive packages, at least for first movers, but up until now history has taught us that the competitive infighting will soon lead to price declines and 'all you can eat' packages.

### 5G Revenue Drivers



#### Bigger, Faster Packages

Short term, mostly first-mover advantage



#### New, Differentiated Apps and Services

Whole new playing field. Variety of new players – winners depend on cost, UI and inter-industry clout



#### New Business Models

Definite option for the near and long term.

Consumers will be willing to pay more for services that provide them a unique value. And unique value means differentiated apps and services. But, everyone understands that consumers will be on the lookout for new services. Therefore, it's likely we'll see various new players vying for the spot on the 'most wanted' app list. These apps' success will depend, not only on cost and user access, but also on user interface (UI) and inter-industry cooperation (more to be said). In other words, carriers will compete not only with other carriers, but also with an influx of new app designers such as manufacturers, developers and start-ups.

New business models are an option. But which ones? And how do you make sure these won't hurt your chances of winning at the app game?

## Exemplifying the Revenue Generating Potential of 5G

Let's have a look at the revenue generation potential through the prism of two of 5G's most talked about services: **autonomous vehicles and drones**.

### Autonomous Vehicles: Today Versus Tomorrow

Today, GPS navigations systems or social media-fed navigation route like Waze make our driving experiences better. These apps enable drivers to plan a route, sometimes in real-time through inputs of traffic patterns from road systems or other users. Each driver, can plan their own system, with no concern for out regard to other drivers.



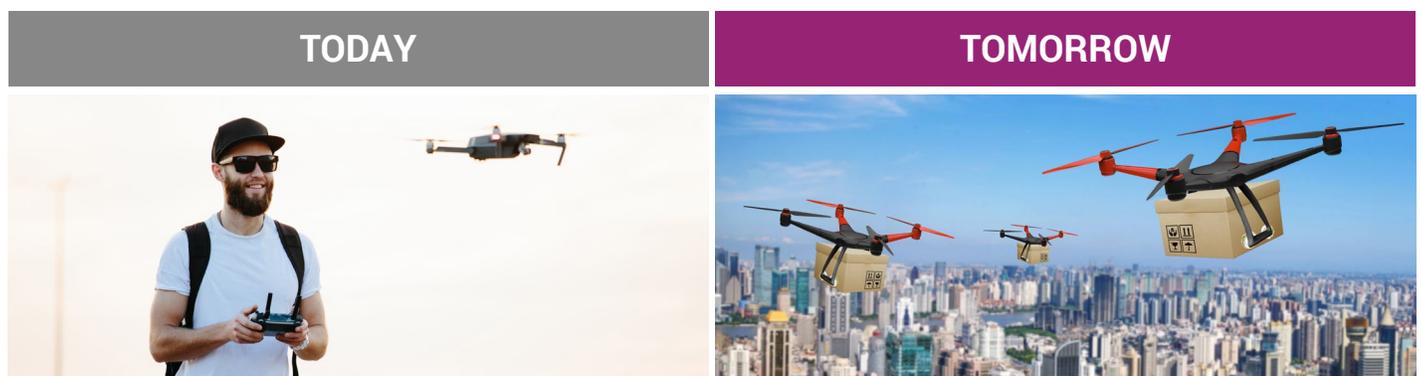
Tomorrow's autonomous vehicles aim to do more. They will perhaps rely on the same type of GPS/ location-based data, but they will seek to improve user experience by using other input sources. These will include inputs from other cars and other networks to plan the fastest and most fuel-efficient routes.

Autonomous vehicles will need to collect and analyze information such as:

- Exact location
- Destinations
- Road conditions
- Reported traffic events
- Traffic statistics (speed, density, etc.)

### Drones: Today Versus Tomorrow

Today's drones are mostly locally user-controlled, whereby a single user controls a single, non-coordinated drone. Control is based on information and data the user can see with their own eyes.



- Limited range and reach
- Local, limited control
- No inter-drone coordination

- Extended range and reach
- Centralized and autonomous control
- Multi-drone coordination

Tomorrow's drones will do more. They will travel further, so the user no longer has eye contact, and they'll require information in route. Multiple drones in the air will need centralized control, with knowledge of the location and direction of other drones to avoid collision (similar to flight plans in airplanes).

So autonomous drones will need to collect and analyze information such as:

- Exact location
- Traffic statistics (speed, density, etc.)
- Destinations
- Reported traffic along route
- Weather conditions.

In theory, developing an autonomous vehicle or autonomous drone app is simple. After all, service providers collect the above mentioned information consistently. In practice, not so much. Why? Because of three key obstacles:

- 01** While carriers have much of this information, they do not have information collected by others (perhaps by different nodes and coverage). Competition amongst the carriers may prevent civil cooperation and a fair exchange of information.
- 02** Carriers are not the only ones in the game: car manufacturers (.e.g. Tesla) and retail suppliers (such as Amazon) may be interested in developing their own app, for various reasons.
- 03** Third-party app developers – as in other cases, they'll be vying for a piece of the pie.

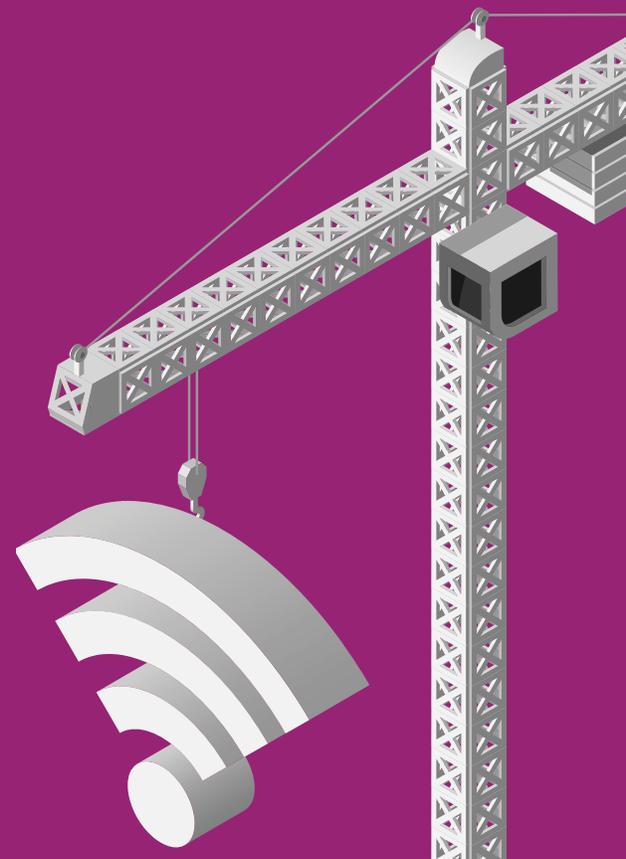
### Case in Point: The Public Internet

The app story is not a new one and reminds me of the situation that arose when the public internet was established.

No one person, company, organization or government runs the Internet. It's a globally distributed network comprising many voluntarily interconnected autonomous networks. It operates with no central governing body as each constituent network sets and enforces its own policies. Its governance is conducted by a decentralized and international multi-stakeholder network of interconnected autonomous groups.

To help ensure interoperability, Internet Corporation for Assigned Names and Numbers (ICANN) administers several key technical and policy aspects of the underlying core infrastructure and the principal namespaces.

For service providers, this cooperation extends not only to questions of infrastructure, but also of cooperation, payment and reimbursement, and net neutrality.



## Carriers Have a Choice

With the transition to a 5G world, service providers will have a choice as to where they focus. In a white paper earlier this year, PwC published 'A Tale of Two Telcos'. This paper brings forth two service providers, who seeing their traditional market shrink, decide to focus their efforts in different ways.

One carrier decides to focus on its core strength (i.e. connectivity services) and another decides to become a content provider of sorts. And while this black and white approach may seem a bit extreme, PwC claim that today most carriers are juggling two distinct business models: 1) a utility-like business model around connectivity and, 2) a digital consumer experience business, which relies on content. Their bottom-line: Most service providers aren't really succeeding at either.

So what will be the options in 5G?

	 <b>Focus on Connectivity</b>	 <b>Build/Provide Apps</b>	 <b>API Economy</b>
<b>PROS</b>	<ul style="list-style-type: none"> <li>Short term, mostly first-mover advantage</li> </ul>	<ul style="list-style-type: none"> <li>Most service providers excel at other tasks: connectivity, engineering, billing, not at building complex user apps</li> </ul>	<ul style="list-style-type: none"> <li>Leverages information/data the SP has for other purposes</li> </ul>
<b>CONS</b>	<ul style="list-style-type: none"> <li>Connectivity is a commodity</li> <li>Downhill battle of declining margins</li> <li>Predicated on streamlining operations and driving performance excellence</li> </ul>	<ul style="list-style-type: none"> <li>Requires developing new strengths and capabilities</li> <li>Requires 'coopetition' with other carriers/transfer of information</li> <li>Requires buy-in from manufacturers and users</li> </ul>	<ul style="list-style-type: none"> <li>Someone will be willing to buy – (eg. middleware provider)</li> <li>Makes more sense as carriers can focus on their core capabilities and know-how</li> </ul>

## Ushering in the API Economy

I believe 5G will usher in another, third option – the API economy – which enables carriers and other organizations to monetize the data they accumulate on a consistent basis. APIs encapsulate logical business concepts like core data entities (think customer or product) or transactions (for example, “place an order” or “get price”) as services.

An API economy, is the exposure of an organization’s digital services and assets through application programming interfaces (APIs) in a controlled way. In this context, the word ‘economy’ refers to the careful management of available resources and the term API economy can be used as a synonym for API management.

The API economy is not a new concept. OTTs worldwide make massive use of APIs. From Salesforce.com, to Netflix, to Facebook and Google. APIs already exist, and are helping provide better experience for myriad applications. Take Uber for example, how do Uber drivers know where the requestor is? The answer: APIs, which pull location information from Google Maps’ API. In the telecoms world, apps like Twilio enable users to send text messages to others around the world, without having to adapt their message to the text message architectures of each of the different carriers.

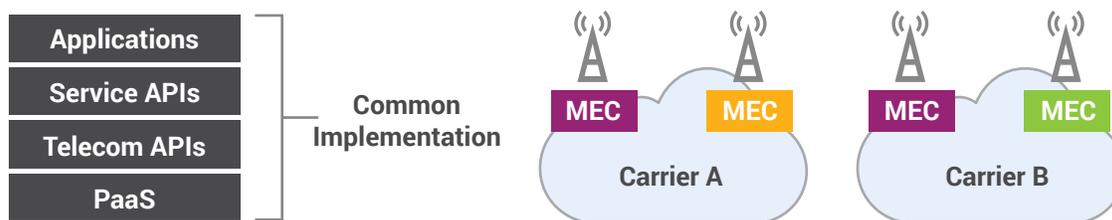


**Global Telecom API Market Size Estimated to Reach \$218.8 Bn by 2022\***

API design and OpenAPI specifications have introduced controls to manage their life-cycle, including:

- **Versioning** – the ability to change without rendering older versions of the same API inoperable.
- **Standardization** – a uniform way to express and consume APIs, including COM, CORBA object brokers, web services and today’s RESTful patterns.
- **API information control** – this includes metadata, approaches to handling batches of records, and hooks for middleware platforms, message brokers, and service buses.

To benefit from and leverage APIs, network models will require a different data architecture:



(Source: Zion Market Research)

### The Path Less Traveled

The path to tomorrow's API economy is not easy or intuitive. While basic connectivity services are more or less standardized and agreed upon, application delivery concepts are nowhere near. This means different vendors can design and provide APIs that are built differently. As such, users and developers need to deal with various APIs for the same services – very similar to the modus operandi of the cloud service providers today.

While developers may accept punishingly slow migration from cloud service provider to cloud service provider, they will definitely not accept the same from MNOs. Unfortunately (or not), our expectations from MNOs are higher and more demanding. To succeed, operators and developers must:

- Define what APIs are needed per application (e.g. 'get exact location', 'get traffic statistics', 'get same destination cars' etc.)
- Achieve this across providers, as it is naïve to assume carriers will be:
  - the only ones supplying applications for autonomous vehicles, drone control, smart cities etc. It's more likely application owners/ manufacturers will supply these from their ecosystems (Garmin, google, WAG etc.)
  - able to lock application owners/users into their own ecosystems

This may lead to additional new players such as API Integrators or Aggregators, who aggregate and collate data from the various API providers, and in turn provide information in standardized form to application developers. These aggregators may also provide other standardized services to the developer community, such as analytics, AAA, Blockchain and more.

### The Light at the End of the Tunnel

In spite of the buzz, true 5G is far from being implemented into today's networks. This paper, as well and some of my former works, highlight the gaps that remain before 5G's potential can be maximized.

#### **Regarding network architecture, we have yet to standardize:**

- Network slicing connectivity
- Defining and managing numerous service profiles
- APIs
- Proactive assurance

#### **Moreover, success will rely on carrier collaboration across various parameters such as:**

- Dynamic contracts (Blockchain)
- Dynamic service creation
- End-to-end (cross carrier) service assurance
- API Integrators

That said, 5G does offer true opportunities for the strong at heart. Service providers should not wait for the technology to mature, nor the standards to be written. Rather they should use this time to define their goals and vision. Will they focus on connectivity services, or develop a content business? Perhaps they should lead the charge to the API economy? Only they can decide which option is best for them. However, a choice should be made, because if history teaches us anything, it is that not choosing is NOT a strategy.

Lastly, regardless of the choice, let me offer some advice:

- **Move fast** – the market will not wait for you. As I write, there are no doubt first movers already negotiating the API economy. If you intend to influence the economy – speak up. Don't let others decide for you as they did with the internet.
- **Be willing to give up those aspects that do not suit your business** – not every service provider can become a content provider. But you can move up the value chain and ensure you maximize your revenues.
- **From competition to coopetition**, 5G will require more from you – from everyone. Most importantly, it will require inter-carrier cooperation (or coopetition) with the goal of providing end-to-end services – so those that are initiated at one carrier and end at another carrier.
- **Enjoy the journey** –at the risk of sounding quaint, let me suggest you take the time to enjoy the journey. This is the 'road not taken' (before), by you or any other carrier before you.

**YOU are making history – make it RIGHT!**

**Contact us for more information about how Ribbon can help you meet  
and overcome the 5G network connectivity challenge at [rbbn.com](http://rbbn.com)**

### About Ribbon

Ribbon Communications (Nasdaq: RBBN), which recently merged with ECI Telecom Group, delivers global communications software and network solutions to service providers, enterprises and critical infrastructure sectors. We engage deeply with our customers, helping them modernize their networks for improved competitive positioning and business outcomes in today's smart, always-on and data-hungry world. Our innovative, end-to-end solutions portfolio delivers unparalleled scale, performance, and agility, including core to edge IP solutions, UCaaS/ CPaaS cloud offers, leading-edge software security and analytics tools, as well as packet and optical networking leveraging ECI's Elastic Network technology.