

COVID-19 AND THE TELECOM INDUSTRY

OPPORTUNITIES AND CHALLENGES

Whitepaper

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COVID-19 outbreak has proven and underlined the fact that telecom industry is on the front lines of the world economy. Telcos are on a mission critical to keep the community connected with more values and ensure continuity in business operations during the pandemic. It also shows that advanced technology such as AI and 5G are critical to deliver solutions and platforms that can help fight the pandemics. this opens many service opportunities, however, with many challenges that telcos face as a result of COVID-19 crisis.

1. The new global behavioral and landscape changes as a result of COVID-19

Since first being recorded late last year in China, the Covid-19 coronavirus has spread around the world. By April 14th, 2020, there are more than 1.9 million confirmed cases and at least 120,000 have died. As a result, COVID-19 has been declared a pandemic by the World Health Organization with the action of sending billions of people into lockdown as health services struggle to cope

Figures 1&2 show the number of cases and the number of deaths since the day of the 50th case using a log scale

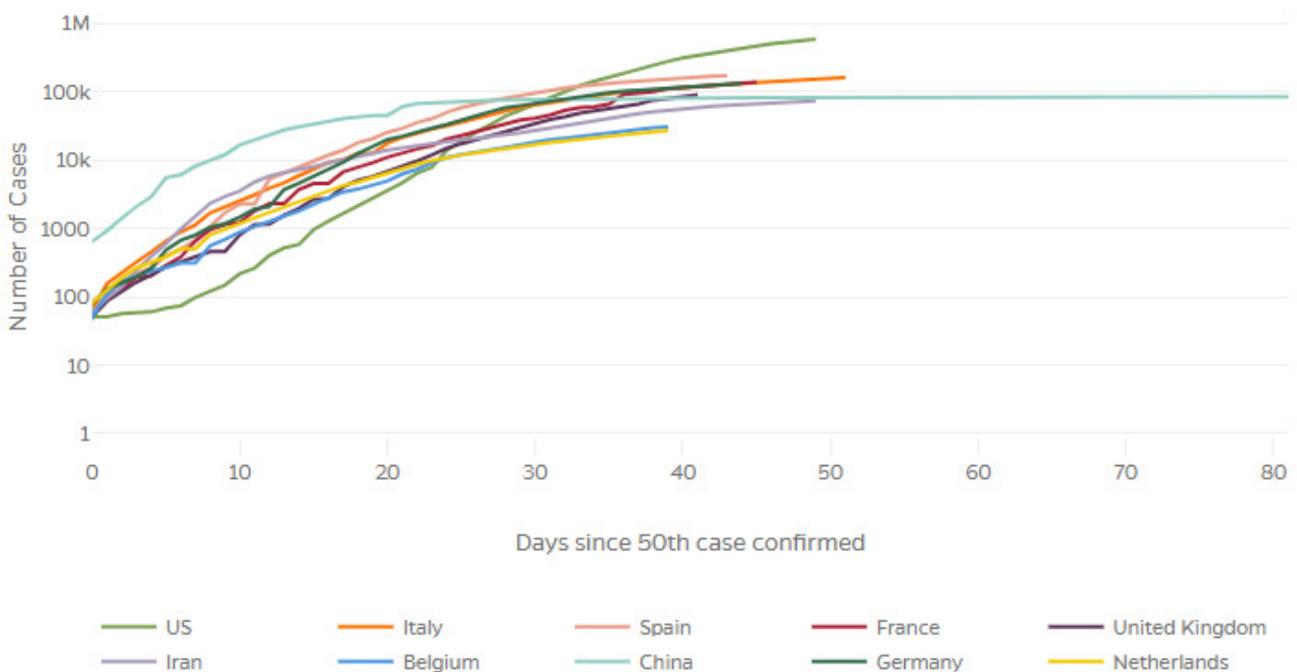


Figure 1

Figure 1: Confirmed cases of Covid-19 for selected countries

Source: Johns Hopkins CSSE

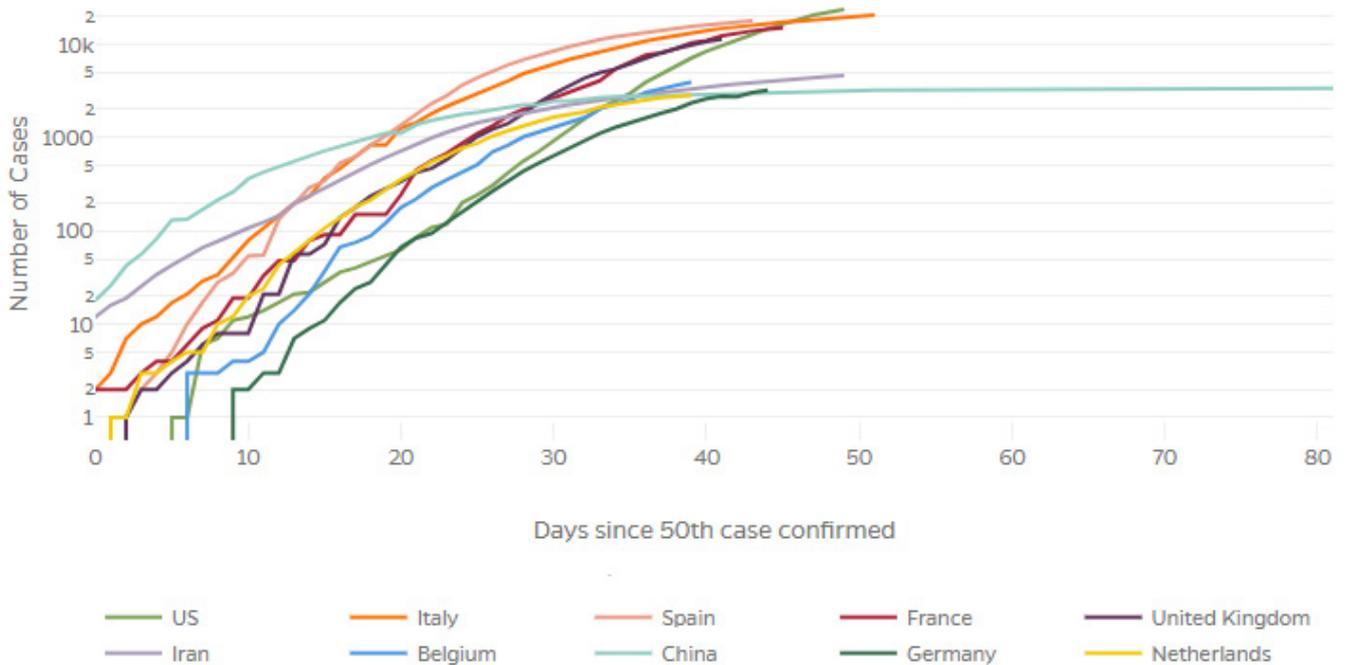


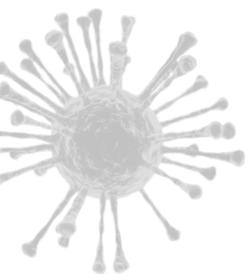
Figure 2

The ongoing spread of the COVID-19 has become one of the biggest threats to the global economy and is causing widespread concern and economic hardship for consumers, businesses and communities across the globe

The “new normal” that includes social distance and working from home has created challenges with daily activities, regular work, needs and supplies causing delayed initiatives and missed opportunities

Figure 2: Confirmed deaths cases of Covid-19 for selected countries

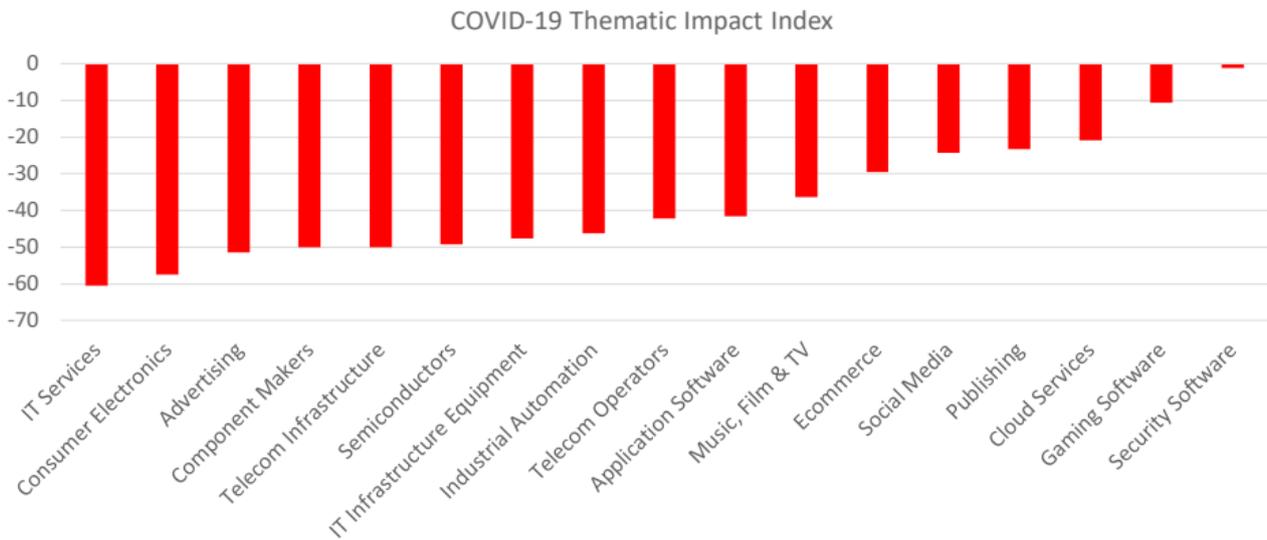
Source: Johns Hopkins CSSE



The COVID crisis has substantial impact on the telecommunication industry. The graph below, by Global Data, shows that all 17 TMT (Technology, Media and Telecom) sectors will be negatively impacted by COVID-19. The figure shows that no technology sector is immune to the effect of COVID-19, but some will suffer more than others. It also shows that the IT services industry will be worst hit



All 17 TMT sectors will be negatively impacted by COVID-19 in 2020
IT services and consumer electronics will be the hardest hit

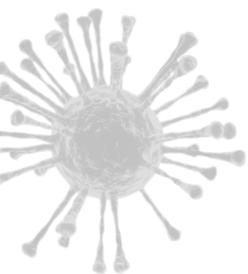


Source: GlobalData. Note: Index ranges from -100 (significant negative impact) to +100 (significant positive impact).

Figure 3

Figure 3: Impact of COVID-19 on 17 TMT sectors

Sources: Global Data



2. Impact on Telecom Industry

The coronavirus outbreak has and still is impacting the information and communication technologies sector. Global Data’s analysis of the share price performance of the leading telcos from January 1st to March 25th, 2020 shows that the worst hit companies are Chinese.

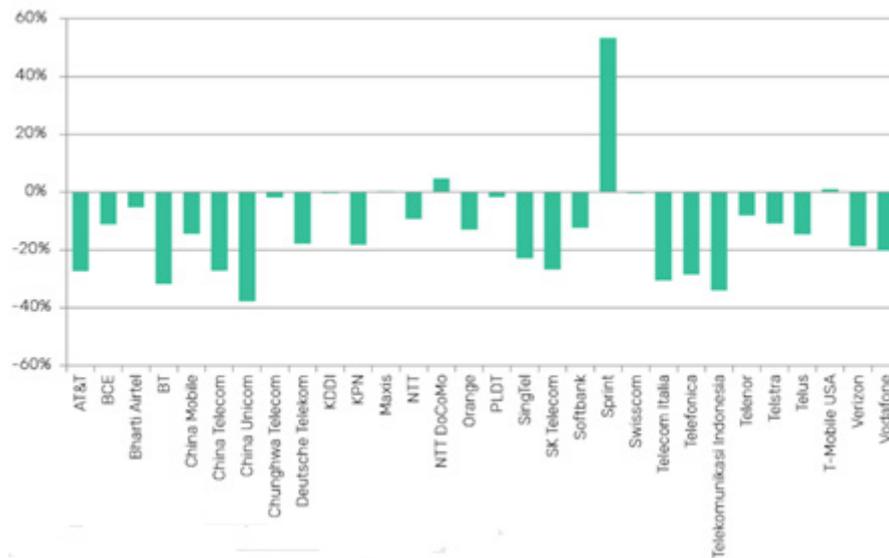


Figure 4

The effect is going to be short-term. As the country has started to ease lockdown, we expect to see acceleration in 5G deployments post COVID.

Figure 4: The share price performance from January 1st, 2020 to March 25th, 2020 of a selection of companies

Sources: Global Data, Technology Intelligence center

2.1 Network performance degradation and the new usage pattern

Network traffic is also showing a “new normal” as most people are staying home and they all are relying on their home internet and cell phones to work and study. This caused a growth of traffic and a change in traffic usage patterns. Most of data traffic is going over the fixed/Wi-Fi networks and there is significant increase in data traffic, picture messaging, streaming, gaming, voice calls, home voice calls and WiFi calling.

Telcos have been reporting significant increases in network traffic based on shelter in place conditions around the world

- AT&T said its core network traffic which includes its business, home broadband and wireless usage was up 19% compared to a similar day at the end of February. In addition, wireless voice minutes of use were up 25% compared to an average Saturday and consumer home voice calling minutes of use were up 53% from an average Saturday and Wi-Fi calling minutes of use were up 69% from an average Saturday.
- Vodafone reported a 24% increase in mobile calls made and received in Glasgow, 14% increase in Bristol, 12% in Birmingham, 8% in Manchester and more than 2% in London. VoIP calls were up 28% at the start of the week.
- Verizon reported an average of 800 million wireless voice calls each weekday, up 33% from its annual voice traffic peak on Mother’s Day. In addition, voice calls are 33% longer than normal.
- Sprint also reported a 20% increase in voice calling and a 25% increase in messaging.
- T-Mobile reported a 26% increase in texting and a 77% increase in picture messaging and the voice calls time rose 17% nationwide. In addition, customers are using their phone’s hotspot 38% more than average
- Broadband provider Windstream reported a 50% increase in voice traffic and a 30% jump in data traffic on its network since mid-March
- Cisco’s Webex collaboration service said that its traffic volumes are up 24 times above its normal range as a result of working from home.

Telcos are constantly monitoring bandwidth and capacity and they are adapting and adding capacity to optimize their networks to the new traffic patterns and ensure network resiliency, avoid congestion and prioritize critical connectivity traffic. They are expanding and augmenting their network to avoid disruption during this critical time. Many service providers also took steps to ease burdens on customers and employees impacted by the crisis and have removed data caps and promised to keep customers connected for at least two months, even if they're unable to pay their bills. In US, more than sort by 700 companies and associations have signed the FCC Chairman's pledge to Keep Americans Connected to ensure that Americans do not lose their broadband or telephone connectivity as a result of these exceptional circumstances.

During the time of pandemic where ensuring that everyone remains connected while being physically isolated around the country is of the utmost importance. Telecom companies are stepping up and collaborating in unprecedented ways to help the general population

Dish, Comcast, Bluewater Wireless, LB Holdings and Omega Wireless announced that On March 16 that they were lending their 600 MHz spectrum for 60 days in markets where it could be rolled out quickly. US operators, AT&T, Verizon and T-Mobile are all making use of excess spectrum to increase capacity on their mobile networks. Adding this spectrum should help to improve the LTE networks and ensure that customers can stay connected and gets wireless speeds that they need. T-Mobile deployed additional 600 MHz spectrum in two days after getting it, according to analysis by Opensignal, T-Mobile doubled capacity and speeds in days. AT&T and Verizon will see similar speed improvements based on the amount of additional spectrum they each got access to. The effort between T-Mobile, Dish and others, in conjunction with the FCC, did exactly what it was supposed to do, Roger Entner, founder and analyst at Recon Analytics, told FierceWireless.

A number of video streaming services have volunteered to limit their bandwidth consumption. YouTube, Netflix, and Facebook have reduced their streaming qualities across the globe to help mitigate network congestion.

It is clear that broadband is very critical in enabling governments, enterprises and consumers to tide over the crises by providing reliable network connectivity, prioritizing essential services and supporting millions of people to work from home and run businesses. Congress' latest coronavirus economic stimulus package positioned Internet connections next to electricity, gas and water as essential utilities worthy of loan forgiveness.

2.2 Stake holders' business economics and investments

2.2.1 Supply chain disruptions

COVID-19 has exposed telecom industry's supply chain vulnerabilities as many organizations depend on China as a global manufacturing hub for the telecom industry and closure of factories amidst Corona fears resulted in the disruption of global supply chains. Though factories and businesses in China are slowly resuming operations, there is an impact on the telecom industry with the COVID-19. As an example, Apple experienced lack of its iPhone supply as a result of its primary manufacturers Foxconn shutting down its production in China, this will result in reduced forecast in iPhone through Q1.

As the virus rapidly spreading around the world, it is important that the telcom industry spend time analyzing their supply chains and making contingency plans to avoid any future disruption and mitigate business risk.

2.2.2 Business Operations

With the outbreak and sweep of the Coronavirus across the world, the biggest challenges for businesses and organizations is business continuity. Telecommunications is a people driven industry, with a dynamic and mobile workforce including teams in offices, in the field, onsite, on trucks and in retail stores. Working from home can reduce productivity and impact business continuity. In addition, remote work can increase security and infrastructure risks.

With this challenge if telcom companies can enable remote working while delivering excellent services this will certainly boost their brands and will open up future opportunities that can be delivered remotely in a cost efficient way.

2.2.3 Collaboration, Innovation and Partnership Opportunities.

In response to COVID-19, Many industry conferences are canceled, the first to be canceled was Mobile World Congress. Industrial conferences are an effective collaboration and connectivity platform for telecom companies to network, share innovations, and establish business partnerships. The cancellation of major technology events has incurred over \$1 billion in direct economic losses, according to estimates from PredictHQ.

Online alternatives helped limit the fallout from canceled industry conferences, but telecom industries will certainly suffer due to limited in-person driven business opportunities and innovations and missed partnership opportunities.

2.2.4 Security

With companies moving to a remote workforce, employees have to send confidential information over an unsecured network and each online tool they use grows the complexity and the vulnerability concerns of their network. Network operations and Security operations teams are facing the challenge to optimize the performance of a network that can physically be located anywhere, while protecting against security threats that are taking advantage of atypical operating procedures.

Recently, there was a recent trend known as “Zoom-bombing,” where the attacker joins an open video conference so as to disrupt the meeting by displaying inappropriate content. The FBI warned of “multiple reports of conferences being disrupted by pornographic and/or hate images and threatening language. Zoom has announced a series of powerful security and privacy moves in response to growing criticism of its service. One of the most significant is the decision to freeze on all feature development and shift its engineering resources for the next 90 days to focus on privacy and security issues, in light of recent cybersecurity concerns that have emerged during the Coronavirus pandemic.

2.2.5 Governments, Policymakers and Regulators

Due to the on-going challenges presented by the coronavirus, Multiple countries including Spain, France, Austria and US have now postponed planned 5G spectrum auctions

The coronavirus has also an impact on the timing of 5G standards, with the finalization of some 5G standards officially delayed by three months. 3GPP said that Release 16 Stage 3 freeze is now due in June 2020. The adjustment was made after all face-to-face Working Group (WG) and Technical Specifications Group (TSG) meetings were canceled.

Covid-19 measures are putting strains on local governments and that in turn is causing delays in infrastructure permits and inspections. As a result, the wireless industry is struggling to secure some work permits while local governments are trying to transition to all-online systems

During this pandemic and to help telcos find ways to meet this important need for connectivity. Regulators need to take extra steps to grant temporary permits to expand capacity and coverage. For example, last month the FCC has granted permission to U.S. wireless carriers, authorizing AT&T, T-Mobile, U.S. Cellular and Verizon to each temporarily tap additional spectrum resources to ensure mobile networks continue to handle any potential increased demand.

2.2.6 Financial bifurcation

COVID-19 is causing financial recession which has a significant impact on the entire economy, this includes telecom companies. Many TMT companies have seen their

valuations lose a third in the last three months on account of COVID-19, making them attractive M&A targets.

All telecom stakeholders including CSPs, broadband providers, OEMs, chipset vendors and devices vendors, OTTs, national infrastructure builders cloud services providers, cybersecurity companies, and managed services providers are impacted and facing financial challenges due to supply chain & logistics disruption, business operation challenges, demand disruption, sales challenges, retail chain closure, economic recession, delays in regulations, policies process, delays in standards, spectrum availability, 5G slowdown and delays or cancellations to many projects such as the large IoT verticals in addition to the above, each stakeholder is facing some other unique challenges.

CSPs and broadband providers are reasonably protected as reliable connectivity is critical during COVID-19 however they are also having challenges due to Sales challenges due to retail chain closures nationwide, reduction of roaming revenue, relaxing limits and out of bundle charges and having to spend CAPEX to augment and optimize their current wireless and broadband networks without being able to monetize this investment in the short term. Verizon said that it would spend \$17.5 billion to \$18.5 billion this year on improving its network, a \$500 million increase in the target range.

Device and Equipment Manufacturers are challenged the most due to change in consumer behavior driving changes in revenues streams and supply chain disruption for almost all devices

Network infrastructure builder are sees an increase of the demand for the field/installation services, but hampered by lock down restrictions

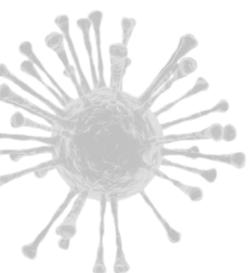
Cloud services companies will benefit from greater home-working activity. In addition, collaborative software tools like Zoom and Slack will see increased demand and are facing the challenges to upgrade and secure their offering.

Cybersecurity companies will also benefit as there is an increased need to keep the remote working employees secure against a growing number of phishing and malware attacks.

OEMs and Managed service providers are also challenged by the potential for a recession that will result in businesses delaying capital spending which reduce B2B business and the increased unemployment rate will put pressure on the B2C business, fall in equipment and services sales, delivering onsite work. IT IT Services industry will have worst hit as the lock down will result in a massive slowdown in IT projects as companies focus on immediate needs during the pandemic.

The financial consequence will not be huge for some vendors who have fixed broadband business units

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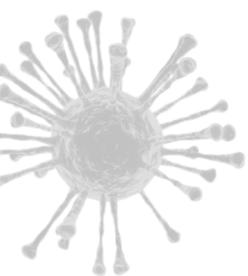
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The financial consequence will not be huge for some vendors who have fixed broadband business units.



2.3 The rise of AI and service innovations

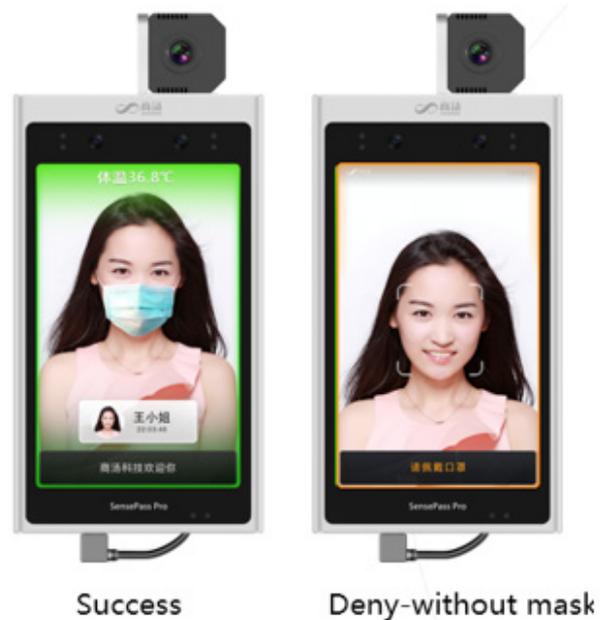
Hundreds of companies are currently investing in AI to help fight against the pandemic and there has been tremendous effort and investment focusing on the use of advanced technology, especially Artificial Intelligence (AI) to fight against this Pandemic.

In this crisis, AI is a significant tool especially in the health care sector to contain the virus and treat patients and support those in need to control the outbreak and stabilize society.

AI applications can be used to screen the population who are potentially infected. Tech Mahindra partnered with one of the Chinese startups to detect COVID-19 symptoms such as Fever by using AI Integrated Thermal Cameras. The solution has integrated facial recognition system that can recognize folks not wearing masks and give alerts



Figure 5



AI can also be used to help with diagnosis. Tech Mahindra has partnered with startup company and delivered an AI solution that can read CT scans for pneumonitis with high accuracy. This AI-enabled diagnosis solution improves CT diagnosis speed and reduce healthcare workers' workload

AI algorithms and its computing power can be used to develop antibody therapies. Using machine learning, various patterns in the antibodies can be recognized to find the ones that show the most promise in fighting off the COVID-19. Tech Mahindra at Makers

Figure 5: Thermal Imaging - Human Body Temperature Measurement and Facial recognition

Lab are working to harness the power of technology to create and compare the protein structures of viruses. Comparing Virus structures and peptide chains can help narrowing the possible cure for viral infections



Figure 6

AI can be used to predict outbreaks by gathering and processing various data sources to predict the number of new cases that are likely to arise in an exposed population, or peak infection rates under a given set of conditions, among other outcomes

In an effort to help leverage the AI technologies to help medical and public health experts and help discover new possible treatments, many research institutions, enterprises, and White House have come together to launch the COVID-19 Public Datasets program called CORD-19. CORD-19 initiative is The project uses AI to develop new text and data mining techniques that can help scientists answer key questions about the origins, transmissions and potential treatment of COVID-19

There are hundreds of envisioned AI driven use cases that can help with pandemic that are needed immediately. This opens new opportunities for telcos to successfully build the ecosystem that can be delivered rapidly and monetized in a collaborative manner.

AI driven solution used in Pandemic control could also drive the development of smart city management model, this includes smart public safety, smart environment, smart healthcare.

Figure 6: The atomic placement of corona virus as compared to the structure available on RCSB database.

2.4 Impact on 5G emergence

5G has advantages over 4G in speed, latency, number of connection points and range. These features can address existing network performance challenges during the pandemic, as well as transform the public health domain and provide new treatment methods.

5G can play a vital role in pandemic fight as 5G thermal imaging can spot the temperature of a moving object without any contact. CNBC reports that 5G, in China, is helping underpin apps that can help monitor individuals' temperatures. Similar initiatives may be a boon across the globe in efforts to triage the pandemic. KRAasia reports that, in Singapore, a temperature-taking tool, underpinned by artificial intelligence (AI) — called iThermo — has utilized thermal and laser technology to take the temperature of people as they walk past the tool.



5G smart robots enable remote interaction via tele-health and telemedicine it can perform many activities including: taking patients temperatures, Delivering medicines to patients, remote diagnosis, remote consultation and remote emergency treatment.

In China, the two Wuhan hospitals are equipped with 5G network, via which patients can ask for immediate help and experts from other regions such as Beijing can discuss treatment plans with doctors working there.

Huoshenshan Hospital is located at a relatively remote area, far from the city center. The primary 4G network could only cover a limited number of users. After Huawei built the new 5G network, the network not only covered the primary users but also the construction workers working on the site, which exceed 3,000.

In addition, 5G network has made remote CT scanning a reality. Through remote 5G transmissions, healthcare workers are able to control the CT scanners in remote hospitals, from a far distance, on a real-time basis.

The solution helped improve the process of diagnoses across the board to prevent unnecessary repeated examinations and optimize the image quality and doses of radiation released on the patient.

5G also enables tele-education and tele-conferencing and makes AR/VR, smart transportation, unmanned vehicle solution a reality

There are a lot of potential digital use cases associated with COVID-19 that 5G can play a key role to deliver them however COVID-19 is likely to cause delays of 5G rollout as telcos are focusing on immediate need to build a reliable broadband and 4G networks to

support traffic spikes as more customers work from home during the outbreak. There are many other reasons that will cause 5G slowdown including: global supply chain disruption, availability of 5G devices, delays in 3GPP release 16 standards, spectrum auction delays, delays in 5G infrastructure permits and inspections, closure of retail stores, economic recession that is slowing down device and service upgrades and lack of 5G demand to validate aggressive deployment strategies,

The 5G Conspiracy theory: there was a recent rumor that new 5G networks caused the COVID-19. Telco experts confirmed that this is completely wrong information and that radio waves don't create viruses however this did not stop threats against broadband engineers and arson attacks against UK phone towers. This conspiracy theory is cited as possible motivation for multiple cellphone tower fires this week. this misinformation spread may also affect 5G rollout plans

5G deployment will certainly be delayed to when the pandemic is brought under control and this will have impact on telcos and will delay the innovation and the promise of 5G deployment in 2020

3. Tech Mahindra strategic insights and views

Our offerings to tackle the unprecedented challenges posed by COVID-19 pandemic

In these difficult times, Tech Mahindra's major focus has been on securing tech assets and ensuring business continuity to our clients. Keeping the critical systems of our clients running remains our key priority. Our investments over the years in collaboration tools have helped us take the disruption caused by the pandemic.

In order to support **Operators, OEM's, Enterprise and Governments, Tech Mahindra** and its subsidiaries **Leadcom** and **LCC** have tuned our Network Services portfolio to cope with the challenges associated with higher social distancing regulations and instantly developed a suite of services that solve the issues of stressed network capacity demands, Bandwidth and Coverage and mitigate the challenge of the need for remote operations. Three main solutions are currently available, these are: **Network Coverage and Capacity Augmentation solutions, Customer Experience solutions and Remote Operations to support**

In addition to our core service offerings, we are partnering with **100+** disruptive new age technology players, start-ups, and academia globally to deliver best in class AI and 5G solutions

Tech Mahindra, as an innovator and a leader in AI and 5G, has developed multiple solutions and is ready to partner with the government, local communities, operators, OEMs and business partners to build an overall solution that help reduce and/or eliminate the risk

of COVID-19 Pandemic. For example, we have partnered with **Sensetime** to develop two solutions for detection and diagnosis of COVID-19 through **Sensetime thermal imaging human body temperature measurement solution** and **CT scanning solution**.

As the COVID-19 pandemic unfolds, Tech Mahindra research has been actively working with its innovative technologies at our **Makers lab** on COVID-19 Protein Comparison Analysis where we compared protein amino acid chains and found that 99% of Malarial and HIV peptide chains are present in COVID-19. Comparing Virus structures and peptide chains can help narrowing the possible cure for viral infections.

Tech Mahindra's remote monitoring and diagnosis solution "**TechM InSis Platform**" is key to enabling key management decisions in the new age of social distancing. Remote monitoring through mobile and laptop helps access process excursions, process safety, throughput, value at risk in fluctuating product demand, price, mark to market of inventory holding working capital and credit defaults. **InSis** software can be downloaded to any VM or physical machine and mobile.

Tech Mahindra's Workspace as a Service "**WaaS NxT**" is designed to deliver the highest level of security using hybrid work space delivery model that leverages Virtualization, Enterprise, Mobility and Context Aware Security. It delivers all Workspace resources as a Universal Single URL to consolidate all end user computing services. This model will bring all services under a single window to avoid duplication of investments and improve end-user experience. Over **22,000** users were moved to **WaaS NxT** for a leading financial service provider in Australia and resulted in **125%** utilization of office space and **60%** reduction.

The path Post COVID-19

It's a fact that there will be an immediate set back on supply chain, investment, operation and delivery as a result of COVID. We do not think it will have a lasting effect on the main telecom direction that has been emerging since the middle of the last decade which is characterized by digital transformation, AI, 4G/5G.

Telcos will continue to play a critical role after the pandemic. We expect continued investments in network capacity and infrastructure to build resilience for similar future crises. Uncertainty around the current crisis is increasing the awareness of similar threats in the future.

In addition, some of the structural changes in remote working will continue post-COVID-19, resulting in continued strong demand for B2C fixed broadband. Telcos will continue to prioritize capex in infrastructure required post COVID-19, in particular reliable and widely available global home broadband (FTTH or FWA)

Telcos will focus on digital transformation and reprioritize capex plans to focus on virtualization, automation, digital operations, and accelerating the transition from traditional voice to unified communications

This pandemic will stimulate and turn the eyes towards enterprise applications and industries (health and education) digitalization and services innovations. New technologies benefits and values (AI/5G) and the proof that these are invented to serve our lives and disasters not just entertainment. Post pandemic, the economy recovery will happen with a very fast pace that will spur consumer and business confidence starting from Q3/Q4 (new

iPhone will also be a psychological key in there).

COVID-19 accelerated the development of AI tools to fight the pandemic. Once the crisis has passed, most of the AI tools that are developed to fight COVID-19 will stay. It's also likely that these COVID-19 use cases will inspire new ways to use AI to advance scientific. We also expect continued positive demand and growth on AI driven use cases in the area of intelligent telehealth, cost control, virtual work culture, tele-education and smart city, process automation, self-service bots around customer care and intelligent operations

Coming out of COVID-19, millions of users will be connected and familiar with digital tools. There will be an increasing number of businesses and customers already using digital and cloud based services. There will be an increase of the infrastructure spending to support 5G use cases. We are expecting to get back to strong growth mode in the telecommunication segment, primarily driven by 5G.

Security now takes even a larger stage, the high reliance of economic activity on telco networks will require tighter monitoring and further investments into the cyber security solutions. Post-COVID, some of the working behaviors are likely to be permanent. Coming out of COVID-19, enterprises will have to re-evaluate security processes and policies for remote working and prioritize cybersecurity solutions. The security aspects of products and solutions have to be integrated early on from the design phase.

COVID-19 showed that the supply chain resiliency was insufficient during the pandemic. We expect supply chain diversification and efficiency will be major focus after the pandemic

We also expect accelerated consolidation across fixed, mobile, cloud and reseller landscape: there will be some impact from small companies and resellers going out of business during the pandemic and we expect to see acquisition of distressed companies and this will change the telecom landscape

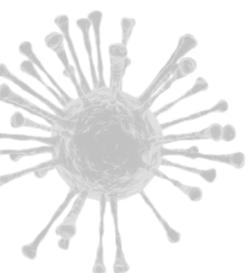
The COVID-19 situation provided a way for telcos, enterprises, governments and medical professionals to collaborate and innovate to implement advanced use cases driven by COVID-19. We expect collaboration formation of new partnerships and innovation to continue in a very positive way post COVID-19.

It is also likely that content production and consumption will continue to take advantage of progressing digitalization altering the customer preferences, channel mix, operations, revenue and delivery models

Depending on the severity of the economic impact, cost-cutting measures might continue in the longer term

Tech Mahindra Next (**TechMNxt**) is our answer to the future. It's our strategic transformation approach powered by disruptive technologies to open new ways for better people lives and empower all to live happier, healthier, safer and wealthier. **AI, 5G** are our top priorities and we are investing in the **RADIQAL** suite (extensible Reality, Automation & AI, Distributed Ledger, IoT, Quantum Computing, All powered by 5G and next-gen networks), as areas for the future.

Tech Mahindra believes in the power of AI-based technology combined with 5G while blended with distributed edge computing, cloud and IT functionalities and is committed to serve the world and help our customers grow during and post COVID-19.



Author:

Dr. Nermin Mohamed

Nermin.Mohamed@TechMahindra.com
VP & Head, Global Strategy and Marketing
Network Services, Tech Mahindra

Source

<https://www.techmahindra.com/en-in/covid-19-response/>

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<https://news.cgtn.com/news/2020-03-19/Fighting-COVID-19-with-cutting-edge-technologies-OZCrnKSW4g/index.html>

About us

Tech Mahindra represents the connected world, offering innovative and customer-centric information technology experiences, enabling Enterprises, Associates and the Society to Rise™. We are a USD 4.9 billion company with 130,800+ professionals across 90 countries, helping 964 global customers including Fortune 500 companies. Our convergent, digital, design experiences, innovation platforms and reusable assets connect across multiple technologies to deliver tangible business value and experiences to our stakeholders.

Tech Mahindra is the highest ranked Non-U.S. company in the Forbes Global Digital 100 list (2018) and in the Forbes Fab 50 companies in Asia (2018).

We are part of the USD 21 billion Mahindra Group that employs more than 200,000 people in over 100 countries. The Group operates in the key industries that drive economic growth, enjoying a leadership position in tractors, utility vehicles, after-market, information technology and vacation ownership.

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connect@techmahindra.com
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