

Connecting the Dots: Key Strategic Opportunities in a Post-COVID-19 World

June 2020

Omdia

askananalyst@omdia.com

© 2020 Omdia

Brought to you by Informa Tech



COVID-19's lasting legacy for tech: The acceleration of inevitable—and ultimately positive—change

COVID-19 has already advanced the progress of several tech megatrends in an extremely short period of time. Understanding which technologies and services will underpin the post-pandemic digital economy will be critical to success.

The notion that consumers and enterprises will conduct a growing amount of their lives and businesses online is nothing new. At a macro level, it's a change that's been happening gradually over nearly 40 years, however rapid the pace of change has felt on a personal or professional level.

The scale and scope of COVID-19 is changing that pace. With more people necessarily relying on technology to work, shop, and socialize than ever before, the move to next-generation technologies, services, and strategies is accelerating at an unprecedented rate.



Clint Wheelock
Chief Research Officer

Figure 1: COVID-19's greatest impact on tech will be a more comprehensive shift to digital technologies and services

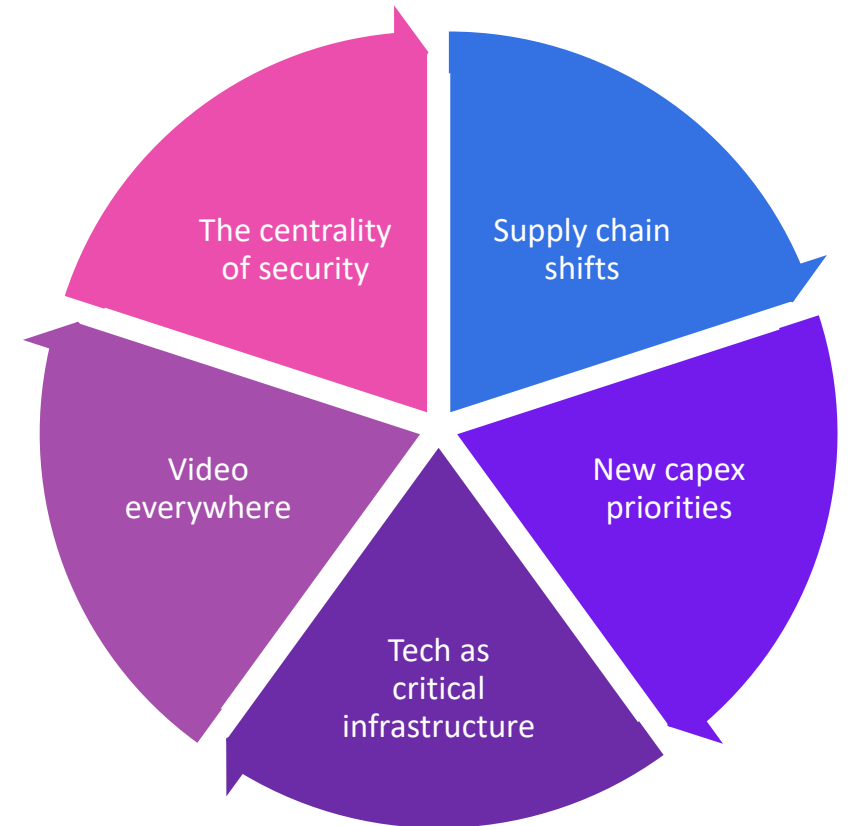
Everyone online	Shifting spend	Pervasive cloud	Digital first
<ul style="list-style-type: none"> Consumers, employees, and citizens across demographics and sectors worldwide are embracing an array of digital activities and technologies throughout their personal and professional lives. 	<ul style="list-style-type: none"> Deferred spending and postponed capex projects will ultimately be offset by growth in spend on innovative online services by consumers and digital transformation by enterprises. 	<ul style="list-style-type: none"> Physical limitations will necessarily affect spending on physical goods and infrastructure, but they will also lead more consumers, enterprises, and service providers to seek on-demand and virtualized solutions. 	<ul style="list-style-type: none"> Deploying technologies that are designed with tomorrow's digital economy in mind—whether semiconductors, devices, networks, or cloud services—will be more important than ever.

Five key trends will cut across technology sectors during and after the pandemic

Omdia has identified five interlinked areas where change will cut most deeply across consumer, enterprise, industrial, device, component, and service provider markets:

- **COVID-19 has weakened several key links in the supply chain but will strengthen others.** The smart device market will be hit hard by COVID-19, but the pandemic will have a more nuanced impact on the overall tech supply chain, thanks to booming demand for digital services.
- **As capex patterns change, knowing where new market opportunities are arising will be critical.** COVID-19 will present new opportunities amid the overall market gloom in areas such as telecoms infrastructure, remote monitoring, and healthcare.
- **The pandemic will trigger a rethink of technology as critical infrastructure.** Governments and regulators are taking steps to bolster domestic infrastructure, paving the way for the expansion and evolution of new and existing forms of “tech nationalism.”
- **Video will be everywhere and for everyone.** COVID-19 restrictions are leading more people to watch online video and make video calls than ever before. But video will also enable an array of other innovative applications for consumers, enterprises, and the public sector.
- **Harnessing tech to secure both physical and digital worlds will be more important than ever.** Implementation of social distancing and business closures to limit person-to-person contact have significant implications for how and why companies deploy and use security.

Figure 2: COVID-19's greatest impact on tech will be a more comprehensive shift to digital



Source: Omdia

© 2020 Omdia

“COVID-19 weakens
several key links in the
supply chain—but
strengthens others.”



Len Jelinek

Research Vice President
Components & Devices

Challenges to device sales will be offset by rapidly growing demand for digital services

The smart device market will be hit hard by COVID-19, but the pandemic will have a more nuanced impact on the overall tech supply chain, thanks to investments in 5G, data centers, and other technologies that will underpin the new digital economy.

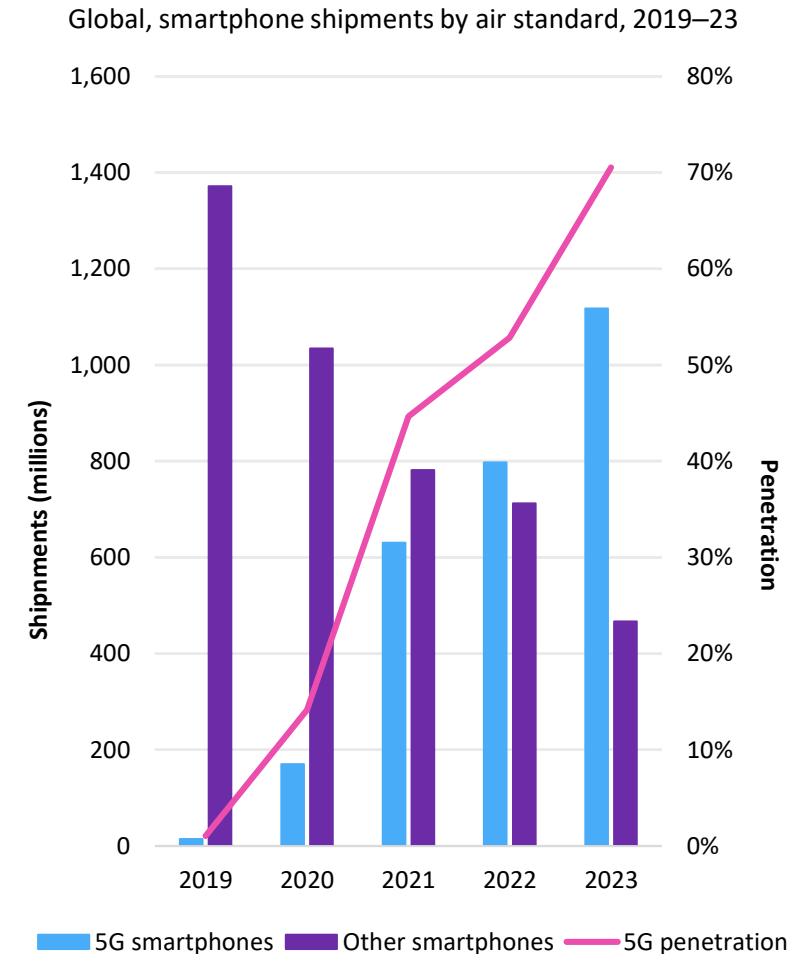
Smartphone sales will fall by 12% this year, and those of TVs, tablets, PCs, wearables, and smart home devices will drop 15–20%, as the global economy contracts and consumer purchases of electronics slow.

The ability of vendors to produce devices will also continue to be hampered by lockdown measures. While China's production has since resumed, some key component manufacturers continued to face disruptions in March and April. For the second half of 2020, and potentially into 2021, production in important emerging markets outside of China might experience more prolonged disruptions, depending on the capability of local health services to deal with cases in the area.

Continued economic uncertainty will challenge a recovery in the second half of 2020. The polarization of the market is expected to intensify. In emerging markets, stagnating demand means the price of low-tier smartphones will face more downward pressure, while sales of high-end smartphones in advanced markets will increasingly be concentrated among certain brands.

5G offers a ray of hope for device vendors. Many have delayed launches of smartphones based on the next generation of mobile technology due to COVID-19. However, Omdia expects vendors to reschedule to the second half of this year, leading shipments to accelerate to 620 million in 2021.

Figure 3: 5G smartphone shipments set to accelerate in 2021 as launch plans get back on track



Source: Omdia

© 2020 Omdia

Explosive demand for digital services drives investment in next-gen technologies

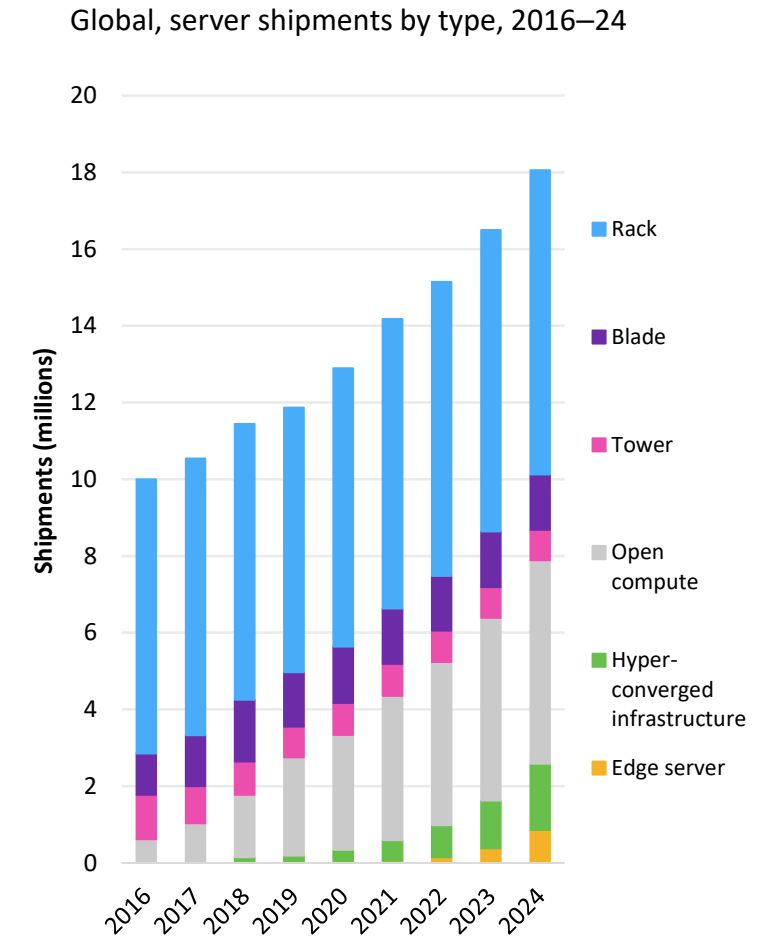
The challenges faced by device vendors might make for grim reading for others in the supply chain. But demand for an array of digital services from consumers and employees in enforced lockdown will drive investment in the technology to support these offerings, both during and after the pandemic.

Increased demand for data-center servers has resulted in record first-quarter revenue for the market. Omdia anticipates this phenomenon will continue through the first half of 2020 to facilitate the provision of digital services, but there will be a weaker second half due to falling enterprise IT spend. For the entire year of 2020, Omdia anticipates the server market will grow 8% on a unit basis. This is an increase of 5% on Omdia's previous growth forecast.

High demand for digital services will be reflected in other parts of the technology supply chain. Omdia forecasts that semiconductor revenue will pass \$120 billion in the fourth quarter of 2020, up 9.7% year on year. Inventory levels of memory chips have been lean this year, due to demand from hyperscale data centers, but also because of strong PC sales driven by work-from-home and online-education mandates.

The supply of silicon, chemicals, and manufacturing consumables involved has also seen minimal impact from COVID-19. Chemical and material suppliers are anticipating only a minor slowdown in demand in the first half of 2020. A modest recovery is forecast throughout the second half of 2020 and beyond, as manufacturing companies ramp up facilities to accommodate a rebound in demand during the third and fourth quarters. The long-term outlook remains strong, with 5G, data center servers, and other next-generation technologies driving demand for materials used in chip manufacturing.













Figure 4: Server shipments to rise 8% in 2020 as data centers gear up to support digital services



Source: Omdia

© 2020 Omdia

Supply chain: Short-term and long-term outlook

 What to expect in 2020	 What to expect in 2021 and beyond
Material supply Material demand increases throughout 2020 as companies continue to manufacture components and remain willing to hold increased inventory 	Material supply Stronger consumer demand results in increased manufacturing run rates 
Manufacturing and capex Weak end market demand slows factory run rates. Capital expenditures placed on hold to preserve cash 	Manufacturing and capex Factory use returns to seasonal patterns; implementation of next-generation technology results in factory expansions for memory and foundry manufacturers 
Smartphones Overall market declines in 2020, with only 5G smartphones anticipated to show modest recovery in the second half 	Smartphones Aggressive transition to 5G as smartphones become affordable and infrastructure is fully deployed; Asia will lead 
Consumer devices* Early demand increases fall off significantly in the second half as stay-at-home orders dissipate 	Consumer devices* Demand slows as replacement cycles become extended 
Displays Demand mirrors consumer demand for end devices 	Displays Small displays increase with 5G smartphone demand; TV and notebook demand continues to see sharp decline 

*PCs, tablets, and TVs

- From silicon to semiconductors, COVID-19's impact has been minimal to date, with chemicals and material suppliers anticipating only a minor slowing in demand in 1H20 and a modest recovery in 2H20 and beyond.
- Demand for computational and medical components has remained strong due to COVID-19 and the implications of staying at home. Omdia anticipates these demands will moderate in 2H20.

“As capex patterns change, knowing where new opportunities are arising will be critical.”



Mark Watson
Research Vice President
Industrial

Telecoms infrastructure, remote monitoring, and healthcare defy the COVID-19 downturn

A global recession and business uncertainty will result in an overall fall in capex on technology in 2020, but some bright spots will emerge.

Given the macroeconomic impact of the pandemic, the majority of businesses worldwide will remain under financial pressure for at least the short and medium terms, inevitably putting pressure on budgets, projects, and workforces.

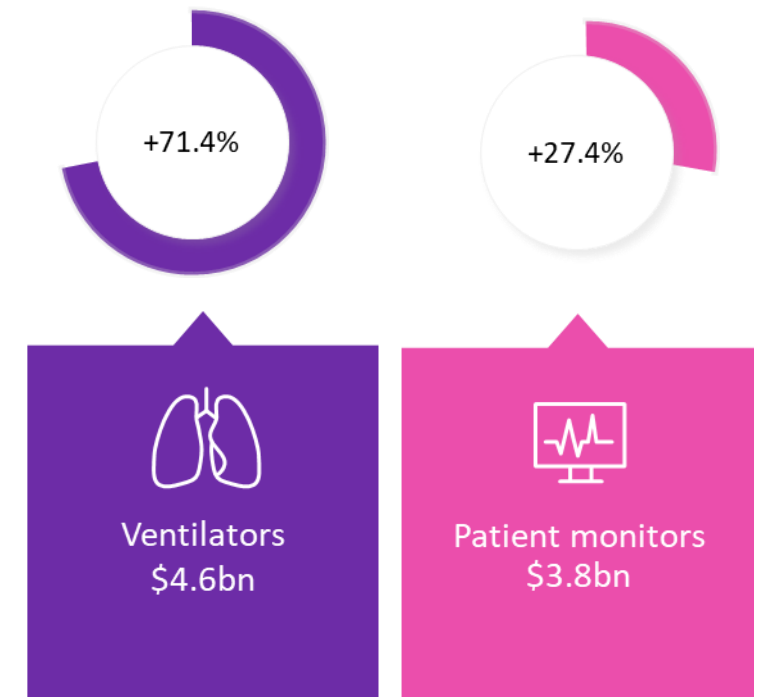
While technology has played an important role in keeping businesses operating during the pandemic, cost pressures will spur reductions in overall budgets. Any new major capital investment projects will be closely scrutinized, with cost/value analysis becoming a greater focus. At the same time, a greater priority is being placed on business resilience and risk mitigation.

A large proportion of planned capital investment projects will probably be postponed until business confidence, market activity, and financial security return. Until then, investment that directly supports revenue will be prioritized. In 2020, some bright spots will appear in the markets for healthcare equipment, remote monitoring applications, and telecoms infrastructure. Investment that supports digital business models, remote working, and asset monitoring will experience positive impacts in 2020.

For the healthcare equipment segment specifically, the major revenue increases projected for 2020 will be driven by demand for devices used in the clinical treatment of COVID-19 patients, in addition to products that monitor and diagnose patient status. A number of country-level stimulus measures are designed to support this sector through the pandemic, such as the CARES act in the US.

Figure 5: Healthcare equipment revenue is a bright spot in 2020

Global, clinical care markets revenue and growth, 2019–20



Source: Omdia

© 2020 Omdia

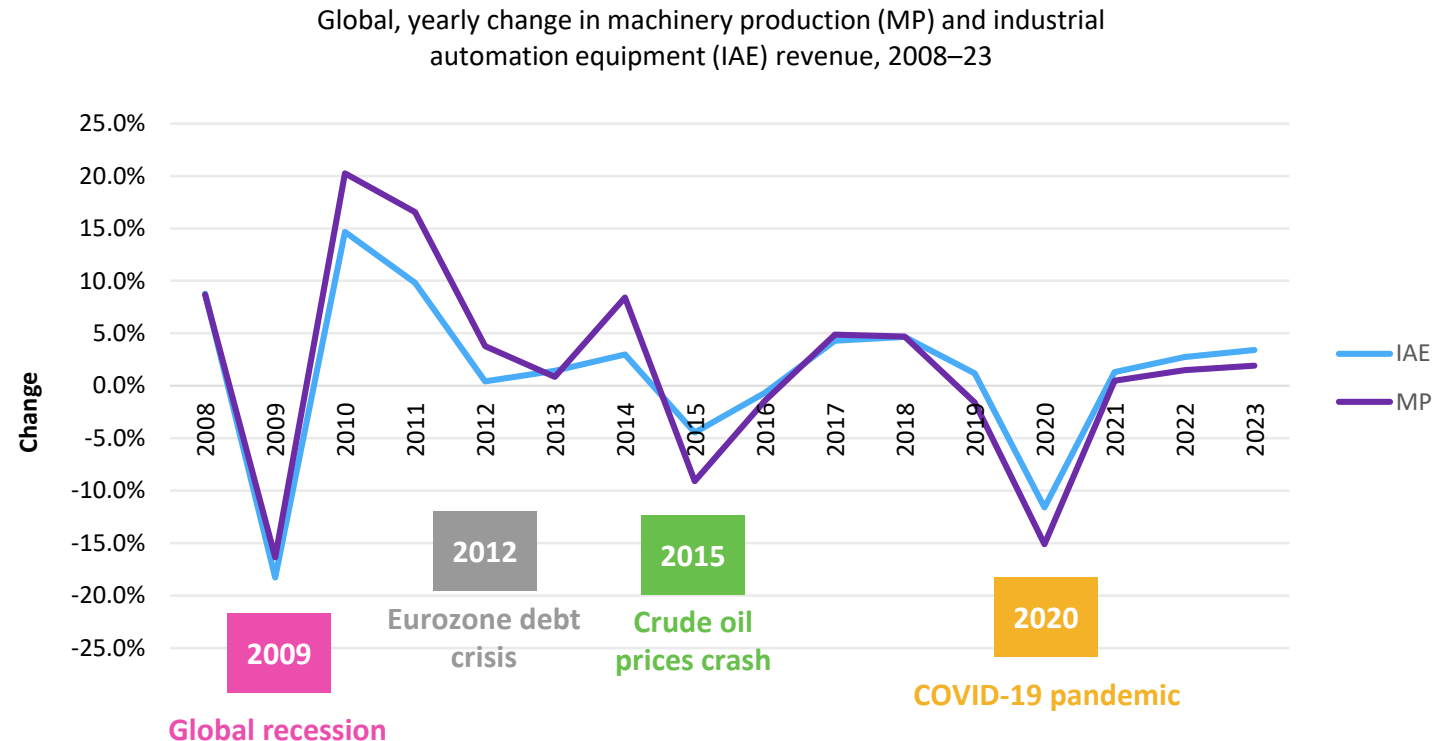
Capex set for mild rebound in 2021 as tech market adjusts to the new normal

Most economies were stagnating even before the COVID-19 pandemic took hold globally. The subsequent hit to many markets and capex plans has been significant. As a result, most businesses that have the option to postpone investment in the short term will do so.

Beyond 2020, there will probably be a new normal, characterized by increased remote working and data access, use of technology to avoid physical contact, tighter travel budgets, and increased scrutiny of return on investment.

Omdia is not forecasting strong rebounds in most of the technology markets that the virus has negatively affected. Instead, companies are expected to undergo gradual improvements that will be laden with debt risk. A cautious forecast foresees a return to flat or very low growth in 2021, without much of an uptick through 2023.













Figure 6: COVID-19 will severely reduce automation and machinery spending in 2020 and dent recovery through 2023



Source: Omdia

© 2020 Omdia

Capital expenditures: Short-term and long-term outlook

 What to expect in 2020	 What to expect in 2021 and beyond
Enterprise IT Investment slowdown and shift in priorities; investment budgets significantly reduced; large projects delayed as capex deferred 	Digital pivot Increased focus on remote working, monitoring, assistance; digital transformation to support workforce, supply chain 
Telecoms IT Accelerated spending driven by remote working and consumer content demand; expansion of transmission infrastructure 	Reconstruction Focus on long-term benefits and value of investment; more use of cost-benefit analysis; scrutiny on procurement 
Healthcare Dramatic rise in investment for diagnosis, imaging, monitoring, and ventilation equipment associated with COVID-19 	AI and edge Focus on delivering simple, AI-led business optimization and operating cost reduction initiatives capable of building new revenue streams; edge services support more automation 
Service provider Revisiting 5G rollout plans; smaller players at risk of defaulting on financing 	As-a-service Pandemic helps to build confidence; applications that enable digital working will experience enduring uptake 
Industrial/manufacturing Major capex cuts from the largest oil and gas suppliers; commodity price crash; loss of investor confidence; drop in machinery production and automation demand 	Security New digital business models and channels boost exposure to threats; increased security spending and investment; increased offering of cloud-based security solutions 

- Expect a greater focus on rapid time-to-value and projects that directly affect revenue.
- Remote working, monitoring, and assistance will be more prevalent, leading to an increased focus on security.
- Certain areas will experience stronger investment in 2021 and beyond, but in general capex is likely to be subdued for some time.

“COVID-19 will trigger
a rethink of
technology as critical
infrastructure.”



Evan Kirchheimer
Research Vice President
Service Provider &
Communications

COVID-19 will trigger a rethink of technology as critical infrastructure

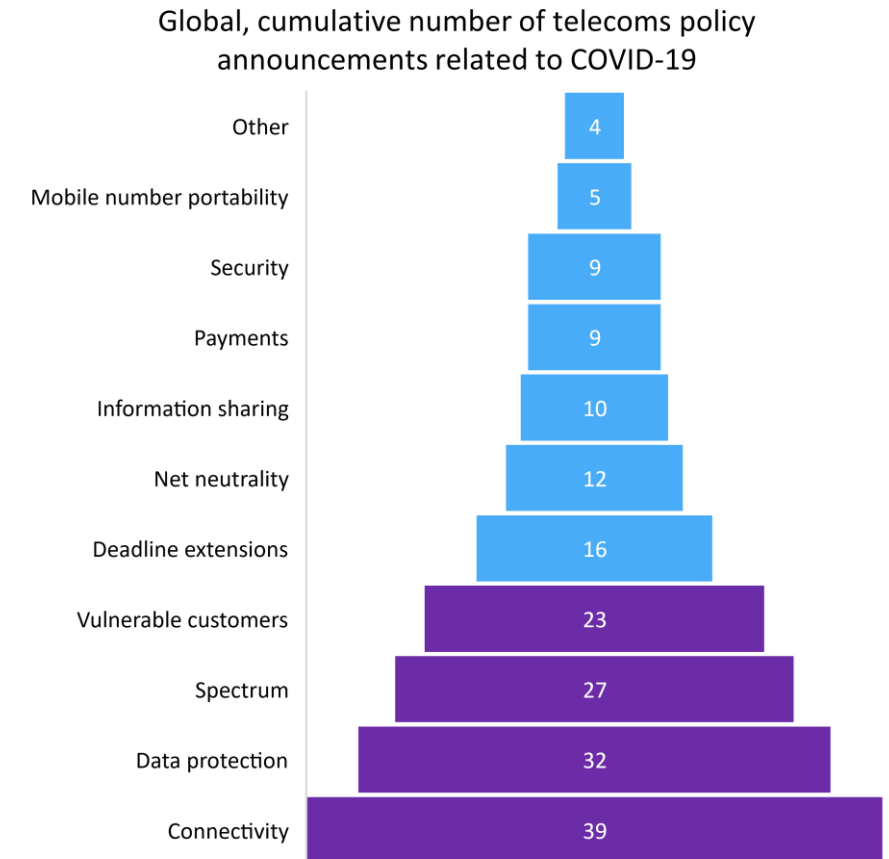
Regulators are taking steps to bolster domestic infrastructure, paving the way for the expansion and evolution of new and existing forms of “tech nationalism.”

COVID-19 is often viewed as a catalyst, accelerating change that would have taken place anyway. Many sectors already boast a higher proportion of remote workers than ever imagined. Will we also emerge with a more government-directed technology sector? Tracking regulatory announcements indicates that the answer is likely to be “yes”:

- From the FCC’s “Keep Americans Connected” pledge to Ofcom’s “Stay Connected” campaign (under which providers are removing fixed broadband data caps), to prohibitions against residential disconnections for nonpayment, it’s clear that COVID-19 is accelerating the move toward further regulatory enshrinement of the right to connectivity.
- The COVID-19 crisis has shone a light on the eagerness of some bodies to use connectivity to monitor their citizenry. Singapore’s government has imposed measures such as sending messages to mobile phones to check who is in isolation. The Slovak president has signed a law allowing state institutions to use telco data to ensure people in quarantine remain isolated.

New practices are rarely rolled back. Omdia suspects that in time, just as communications service providers are now seen as critical national assets in terms of citizen rights and citizen control, so too will other technology service providers. Video and AI for automation and for surveillance will also provide growth opportunities in this state of near-permanent crisis.

Figure 7: Governments are stepping in to guarantee access and bolster privacy



Source: Omdia Telecoms Regulation COVID-19 Tracker

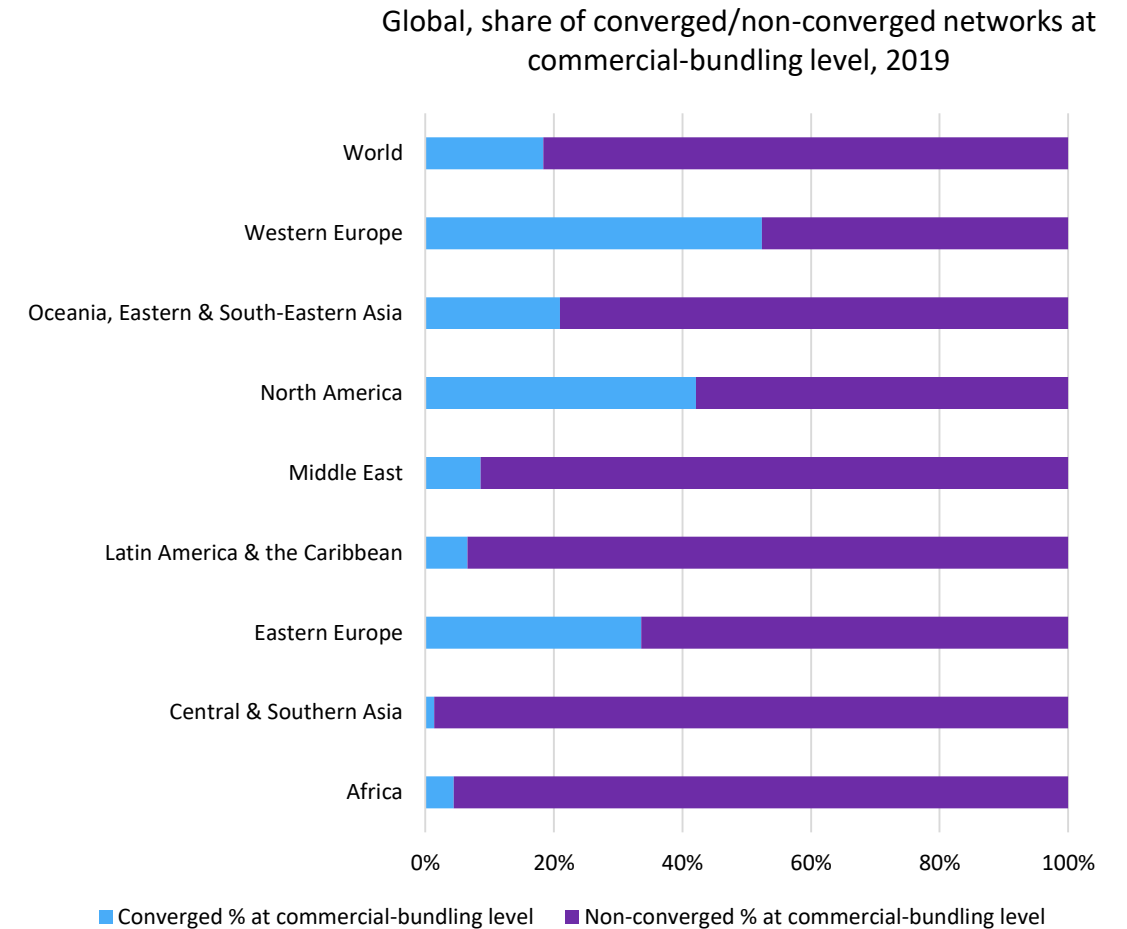
© 2020 Omdia

Convergence, webscale networks, and green 5G take center stage

In the medium-to-long term, infrastructure provider priorities will reflect these new national-directed priorities, whatever one thinks of their merits. Omdia has identified three trends catalyzed by this shift:

- **Convergence:** The resurgence of fixed broadband highlights the need for all providers to offer mobile and fixed services, especially where economic and citizen welfare issues direct communications policy. Still, in 2019, fewer than 20% of CSPs offered a converged commercial bundle. Convergence will finally accelerate, as evidenced by the recent O2/Virgin Media joint venture in the UK.
- **Comms at webscale:** COVID-19 seems to have whetted the appetite for webscale providers to get in on the network business. Facebook's Telecom Infra Project (TIP) and increased vendor and CSP interest in OpenRAN aside, Microsoft's acquisition of Affirmed Networks and MetaSwitch are indicative of an increased pace of network "software-ization."
- **Government involvement:** Debates about Chinese vendors aside, infrastructure has become politicized, and some operators may not be able to afford to strip out existing investments without assistance. And while it is easy to pillory those worried about the health or environmental impact of 5G, public bodies have a duty to educate and reassure their citizenry, which they should not shirk.













Figure 8: Convergence remains a challenge



Source: Omdia Service Provider Fixed-Mobile Convergence Tracker (October 2019)

© 2020 Omdia

Tech as critical infrastructure: Short-term and long-term outlook

 What to expect in 2020	 What to expect in 2021 and beyond
Equality of access Omdia expects more announcements assuring citizen and small-business access to basic connectivity. 	Equality of access As economies struggle to recover, cost sharing among governments, operators, and citizens to maintain services may become more common. 
Data use In some regions, a balance will be struck among data protection, privacy, and public health; in others, the urge to snoop on citizens will be gleefully taken up. 	Data use Expect a robust debate to emerge as data becomes more political, with CSPs forced to navigate social, economic, and business imperatives. 
Convergence It has taken more than a decade for one-fifth of operators to be able to offer converged bundles. We expect the pace to accelerate. 	Convergence Standalone fixed or mobile service providers will be non-strategic and will see their customer relevance decline even further. Convergence becomes a national economic interest. 
Comms at webscale Facebook's TIP and Microsoft's recent acquisitions send a signal that network and cloud distinctions are about to blur. 	Comms at webscale The cloudification of networks gains pace, and CSPs may find they have more options than ever with respect to the evolution of their own infrastructure. 
The role of government Governments will continue to reluctantly step in to further democratize spectrum and to guarantee access and minimum service-level agreements (SLAs) for citizens and businesses. 	The role of government While outright nationalization of telcos is unlikely, we will see more government-directed approaches to network build-out. This includes not just communications, but also cloud and infrastructure. 

- Progress will ultimately depend on the ability of CSPs and regulators to overcome legacy ways of thinking about technology that existed prior to COVID-19.

“Video will be everywhere and for everyone both during and after the pandemic.”



Rob Gallagher
Research Vice President
Consumer

Video will be key for entertainment, communication, automation, and security

COVID-19 restrictions are undoubtedly leading more people to watch online video and make video calls than ever before. But video will also play an expanded role by enabling an array of innovative applications for consumers, enterprises, and the public sector.

Omdia forecasts that video will account for up to 1.9 zettabytes (ZB) of internet traffic this year, up 0.2ZB, or 12% on our pre-COVID-19 forecast. That's equal to an extra 200 billion hours of Netflix viewing or Zoom video calls. Even in 2021, when Omdia expects restrictions to ease, traffic will be up to 9% higher than previously forecast, as video remains part of the "new normal."

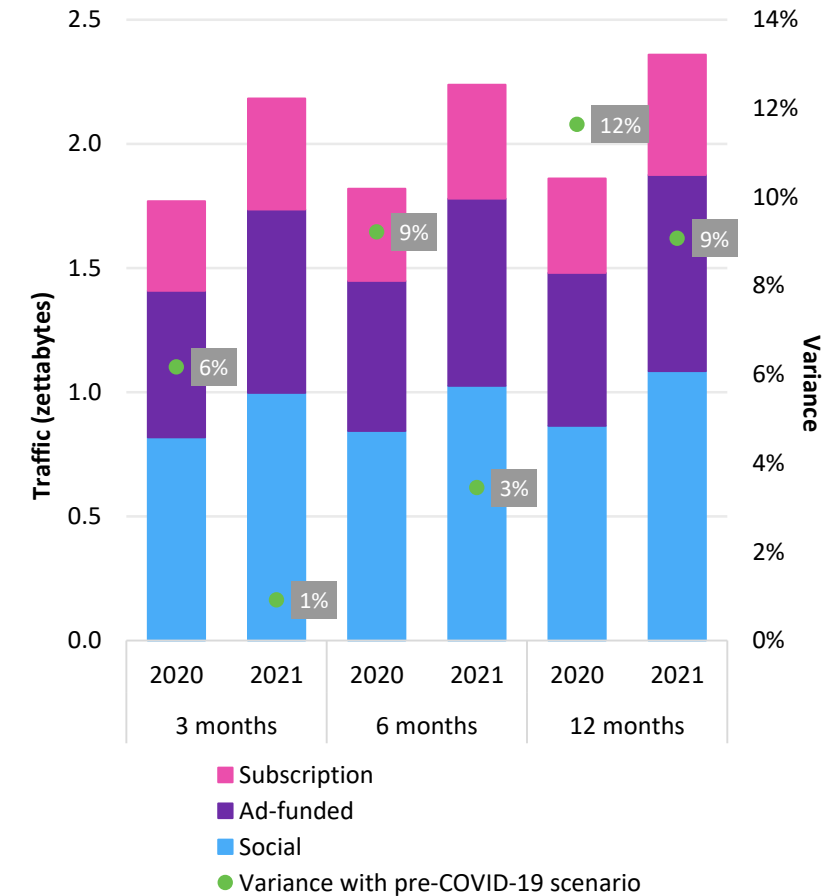
Entertainment and communications apps will drive and capture the majority of increased usage and revenue due to their simple appeal to consumers and employees in lockdown worldwide.

Depending on lockdown conditions, the total number of subscriptions to online video services such as Netflix and Disney+ will be 3–8% higher in 2020 than predicted by our pre-COVID-19 forecasts, passing 1 billion and generating \$65–68 billion in revenue. Spend on digital video rentals and download-to-own video-on-demand (VOD) services will be 8–19% higher. Premium VOD offers, which give consumers online access to movies usually reserved for cinemas, will bring in \$200–800 million in sales this year.

Communication apps such as Facebook's WhatsApp and Apple's iMessage, meanwhile, will attract a staggering 4.5 billion active users by the end of 2020, equal to three in five people worldwide. These users will send more than 6 trillion video messages this year, more than double the number in 2019.

Figure 9: Video traffic on the internet could increase by up to 12% under extended lockdown conditions

Global, video-based internet traffic by type and lockdown scenario, 2020 and 2021



Source: Omdia

© 2020 Omdia

Beyond TV and calls: Video as a key enabler of AI innovation

Retailers and brands will use video to support new shopping experiences, helping to drive \$175 billion of growth in total consumer spend on e-commerce in 2020. These experiences will include live-streamed promotions and augmented reality (AR) apps that enable confined consumers to learn about or try out clothes, furniture, and other goods virtually.

Omdia estimates that there are over 5 billion smart devices in use that have the cameras and artificial intelligence (AI) capabilities required to support these kinds of experiences, including more than 2 billion augmented reality (AR)-enabled smartphones. Premium and ad-funded AR apps alone will generate nearly \$15 billion in revenue in 2020.

Enterprises, meanwhile, will look to video to support more advanced forms of collaboration as increases in remote working become more permanent.

Both private- and public-sector organizations will increase investment in video-based surveillance and security technologies to protect premises, employees, and citizens. Advanced video analytics will be a key area of investment. Applications will include using facial recognition to allow contactless entry to buildings, temperature detection to identify people with COVID-19 symptoms, and crowd monitoring to enforce social distancing.

Figure 10: Billions of vision-AI devices will provide a huge foundation for novel apps













Global, installed base of vision-AI-capable devices by capability level, 2017–25



Source: Omdia

© 2020 Omdia

Video everywhere: Short-term and long-term outlook

 What to expect in 2020	 What to expect in 2021 and beyond
Media Rapid gains from premium video—with subscription count passing 1 billion—will be offset by challenges to ad revenue. 	Media Eased lockdown conditions will unlock advertiser spend, adding to continued revenue growth for premium video. 
Comms Uniform lockdown conditions will broaden video calling's appeal across demographics and scenarios. 	Comms Familiarity with video calling will persist, enabling further integration into more applications and consumers' lives. 
Commerce Retailers and brands invested in video and AR will see increased sales by giving consumers more confidence to buy. 	Commerce Greater comfort with online shopping will provide the foundation for more innovative AR- and AI-based solutions. 
Enterprise Enforced remote working causes immediate and rapid uptake in enterprise video communications apps. 	Enterprise Enterprises will invest to make video-based collaboration a more formal part of their digital strategies. 
Industrial Overall demand for video surveillance and security systems will fall due to project postponements and frozen spend. 	Industrial Investment in video surveillance and security will increase to tackle COVID-19 challenges in both private and public sectors. 

- Pervasive video will raise concerns about privacy, security, and consolidation of power across consumer, enterprise, industrial, and public sector markets.
- Most usage and data in consumer video and comms will be captured by tech giants, though Disney+ and Houseparty show there's room for competition.
- Enterprise and public sector video communications and surveillance will be at high risk of attacks and abuse by bad actors, both internal and external.

“Harnessing technology to secure both our physical and digital worlds will be more important than ever.”



Bill Morelli
Research Vice President
Enterprise

COVID-19 will change how physical and digital security is deployed and used

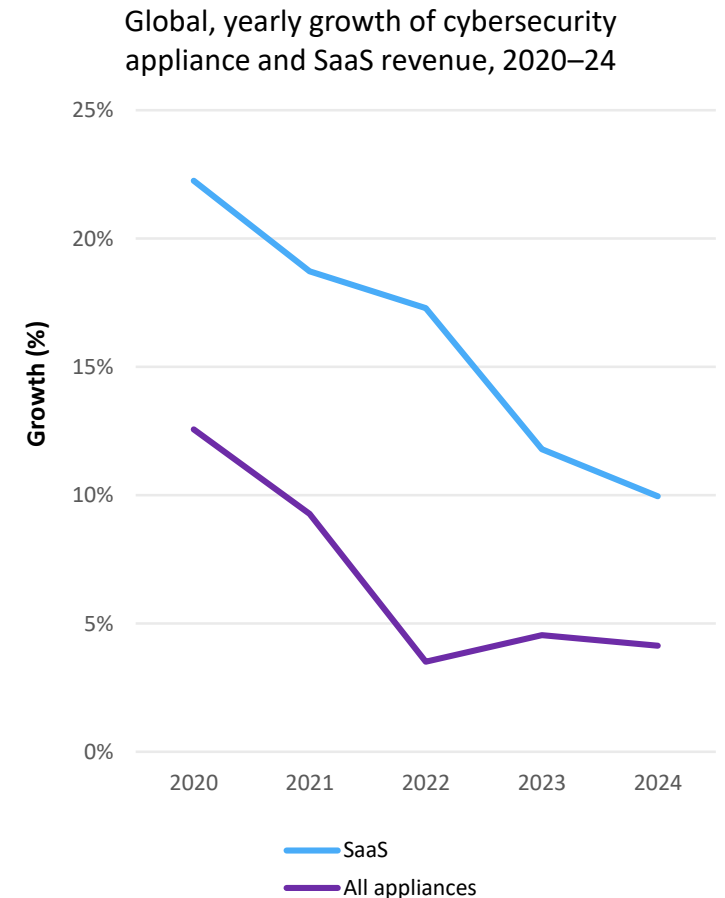
Implementation of social distancing and business closures to limit person-to-person contact have significant implications for how and why physical security is deployed.

The security industry is currently facing several challenges as a result of the policies and procedures being implemented to slow the spread of the COVID-19 virus. The common thread for both physical and digital security is the rapid transition of the workforce from commercial offices to residential locations.

- **Physical security:** There's less need for residential monitoring, and where budgets are tight, it's an expense that can be cut. However, there is more need to monitor commercial property, offsetting the impact for providers with a diverse customer base. But as closure orders have been extended, many SMBs have been forced to close permanently, creating additional challenges for security firms.
- **Cybersecurity:** Network security forecasts for 2020 are down 6.5% overall and content security by about 5%. Network security will be harder hit because most revenue is hardware/appliance-based. However, remote working is increasing demand for web-security software as a service (SaaS), secure access (SSL VPN), and SIG. As expected, all areas of cloud security are seeing strong growth.

Hackers ramp up activity in times of chaos, so even though IT budgets will tighten, security will be a priority for protection and business continuity. Companies will accelerate their move to the cloud to ensure their IT infrastructure is dynamic, and security will have to follow, which will stimulate growth in all areas of cloud security (including virtual appliances of all sorts).

Figure 11: Security application sales will take a hit as the move to SaaS accelerates



© 2020 Omdia

Fundamental changes to security will be required as the recovery begins

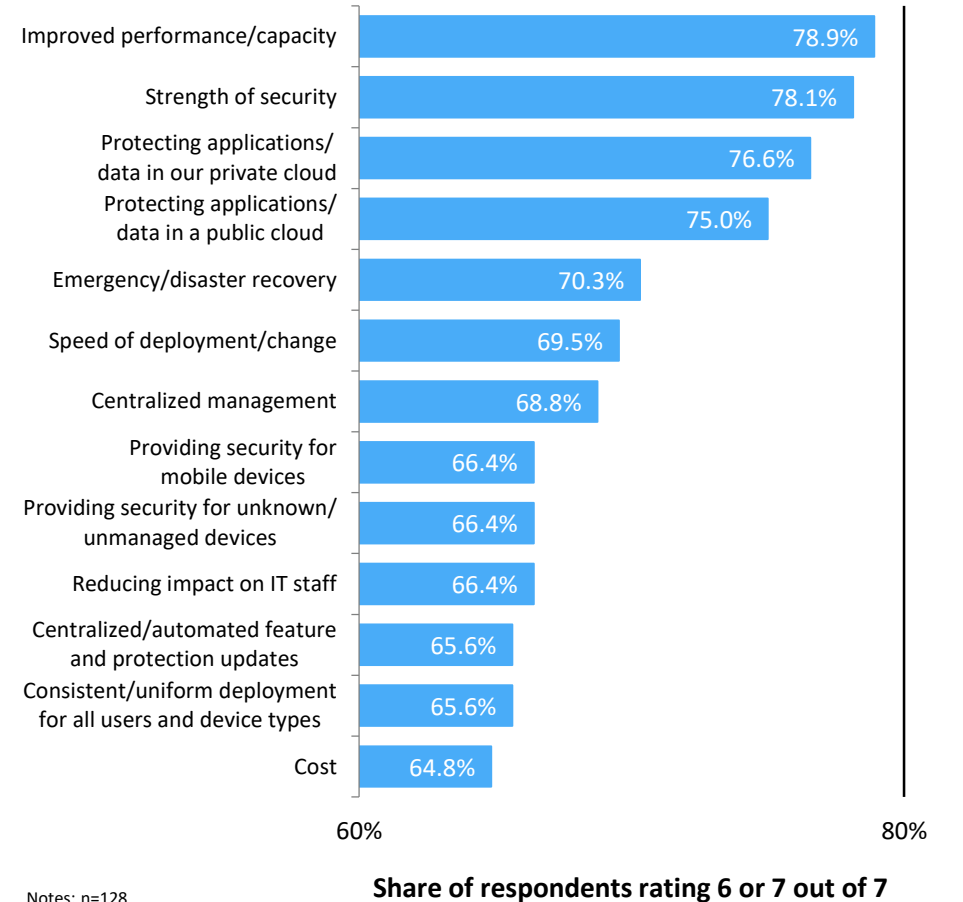
As the world transitions into recovery in 2021 and beyond, the way security technologies are used will be dramatically different, reflecting what the world will look like post-pandemic.

- **Remote working is here to stay.** The impact of COVID-19 on working patterns will continue for some time, and the increase in remote working will be a permanent change. Enterprises will, in the short term, be concerned about further waves of disruption and ensuring resilience in their remote working infrastructure. In the longer term, since much of this infrastructure is still based on older technology, there is the potential for modernization of both physical security and cybersecurity.
- **Data privacy challenges will be significant** as offices, restaurants, sports venues, theme parks, cinemas, and live events all try to find a new normal. Several security technologies can assist, including contact tracing apps and video surveillance systems that can detect social distancing, PPE, and even body temperature. This level of monitoring has historically been viewed as overly intrusive, and it is not clear what tradeoffs citizens will make to feel comfortable interacting in close quarters again.

The challenge will be the investment required to implement the necessary physical and digital security improvements. Governments have already taken on increased debt to offset the immediate impacts of the pandemic, and businesses will need time to recover before they can afford significant capital investment again.

Figure 12: Hosted/SaaS security solutions offer a bevy of benefits

Survey Q: On a scale of 1 to 7, please rate the following factors in your decision to deploy hosted/SaaS solutions for security















Notes: n=128

Source: Omdia

© 2020 Omdia

Security: Short-term and long-term outlook

 What to expect in 2020	 What to expect in 2021 and beyond
Secure access Rapid movement to home working; employees provided with secure access to applications and data 	Cloud-based security Even before COVID-19, there was a strong push to cloud-based security and an acceleration of existing trend away from hardware 
Cloud-based security Organizations deploying cloud apps, services, infrastructure to stay productive 	Intrusion Frictionless biometrics expected to gain traction globally to minimize the possible transmission of germs 
Contact biometrics End users transitioning from traditional fingerprint readers that require physical touch 	CSP security spending Increases in network capacity always drive increases in security spending by network and cloud providers 
Residential monitoring Switch from professional monitoring to self-monitoring as many people are home more due to remote working or job loss 	Data protection Track-and-trace is potentially a key component of the COVID-19 exit strategy – individuals will need to compromise on data privacy but with continued protection outside of COVID-19 
Cyber-security hardware As the transition to cloud-based security accelerates, much of the transition will be away from hardware and appliance-based security products 	Video surveillance Increased use of video analytics – social distancing measuring, PPE detection, and thermal body temperature monitoring 

- IT budgets will prioritize security. There are short- and long-term revenue opportunities for vendors in cybersecurity technology in the face of COVID-19, because humans tend to double down on technology and innovation in times of trouble.
- The use of frictionless biometric readers (such as facial recognition, iris recognition, and contactless fingerprint readers) is expected to accelerate in access control systems as many end users transition from traditional fingerprint readers to minimize the possible transmission of germs.

Appendix

Appendix

Methodology

This report was created by identifying key COVID-19-related themes that cut across the consumer, enterprise, industrial, service provider, and devices and components markets in 2020 from research produced by Omdia. The underlying research was conducted by over 400 analysts using multiple methodologies, including consumer surveys, industry interviews, market tracking, and forecasting.

Authors

Clint Wheelock, Chief Research Officer

Len Jelinek, Research Vice President, Components & Devices

Mark Watson, Research Vice President, Industrial

Evan Kirchheimer, Research Vice President, Service Provider & Communications

Rob Gallagher, Research Vice President, Consumer

Bill Morelli, Research Vice President, Enterprise

Omdia Consulting

We hope that this analysis will help you make informed and imaginative business decisions. If you have further requirements, Omdia's consulting team may be able to help you. For more information about Omdia's consulting capabilities, please contact us directly at consulting@omdia.com.

Citation Policy

Request external citation and usage of Omdia research and data via citations@omdia.com.

Connecting the dots...

Upcoming events

Spotlight on Cloud Native, Display, Cybersecurity and AI: In partnership with Informa Tech's more than 100 media and event brands, Omdia will be participating in the following upcoming digital and live events. We are everywhere for you.

Display Conferences:

- Taiwan Display Conference – July 14–15, 2020
[View the event website here](#)
- Korea Display Conference – June 29, 2020
[View the event website here](#)

Black Hat Series: [View the event website here](#)

- Black Hat USA – August 1–6, 2020
- Black Hat Asia – September 29 to October 2, 2020
- Black Hat Europe – November 9–12, 2020

For all other Informa events, please visit [Informa Tech](#)

AI Summit Series: [View the event website here](#)

AI Summit Hong Kong – August 5–6, 2020

- AI Summit London – September 2–3, 2020
- AI Summit Singapore – September 22–23, 2020
- AI Summit Silicon Valley – September 30 to October 1, 2020
- AI Summit Cape Town – November 10–12, 2020
- AI Summit New York – December 9–10, 2020

Cloud Native: [View the event website here](#)

- Cloud Native World – June 25, 2020

Connecting the dots...

Upcoming webinars

Access Omdia's library of on-demand and upcoming webinars: Join our expert analysts and knowledgeable sponsor partners to get information on cutting-edge technologies and applications. Our webinars contain actionable intelligence to keep you educated on innovations and business considerations you need to know.

[View now](#)

Media resources

Dark Reading: Cybersecurity's comprehensive news site is now an online community for security professionals, outlining cyberthreats and the technologies for defending against them.

<http://www.darkreading.com>

AI Business: AI Business is the leading content portal for artificial intelligence and its real-world applications.

<http://aibusiness.com>

Light Reading: Light Reading is for communications industry professionals who are developing and commercializing services and networks using technologies, standards, and devices such as 4G, smartphones, SDN, network virtualization, 100G optical, IP, Ethernet, big data, FTTH, DOCSIS, and video platforms.

<https://www.lightreading.com>

About Omdia

Omdia is a global technology research powerhouse, established following the merger of the research division of Informa Tech (Ovum, Heavy Reading, and Tractica) and the acquired IHS Markit technology research portfolio*. We combine the expertise of more than 400 analysts across the entire technology spectrum, covering 150 markets. We publish over 3,000 research reports annually, reaching more than 14,000 subscribers, and cover thousands of technology, media, and telecommunications companies. Our exhaustive intelligence and deep technology expertise enable us to uncover actionable insights that help our customers connect the dots in today's constantly evolving technology environment and empower them to improve their businesses—today and tomorrow.

*The majority of IHS Markit technology research products and solutions were acquired by Informa in August 2019 and are now part of Omdia.

Omdia's 400+ analysts and consultants are located across the globe.

Americas	Asia Pacific	Europe, Middle East, Africa
Argentina	Australia	Denmark
Brazil	China	France
Canada	India	Germany
US	Japan	Italy
	Malaysia	Kenya
	Singapore	Netherlands
	South Korea	South Africa
	Taiwan	Spain
		Sweden
		UAE
		UK

Contact us

Customer success

customersuccess@omdia.com

Sales

US: +1 (212) 652 5335

APAC: +61 (0)396 016 700

EMEA: +44 (0)7771 980 316

Press enquiries

Jonathan Cassell

jonathan.cassell@informa.com

Marketing

Louise Barker

louise.barker@informa.com

Disclaimer

The Omdia research, data and information referenced herein (the “Omdia Materials”) are the copyrighted property of Informa Tech and its subsidiaries or affiliates (together “Informa Tech”) and represent data, research, opinions or viewpoints published by Informa Tech, and are not representations of fact.

The Omdia Materials reflect information and opinions from the original publication date and not from the date of this document. The information and opinions expressed in the Omdia Materials are subject to change without notice and Informa Tech does not have any duty or responsibility to update the Omdia Materials or this publication as a result.

Omdia Materials are delivered on an “as-is” and “as-available” basis. No representation or warranty, express or implied, is made as to the fairness, accuracy, completeness or correctness of the information, opinions and conclusions contained in Omdia Materials.

To the maximum extent permitted by law, Informa Tech and its affiliates, officers, directors, employees and agents, disclaim any liability (including, without limitation, any liability arising from fault or negligence) as to the accuracy or completeness or use of the Omdia Materials. Informa Tech will not, under any circumstance whatsoever, be liable for any trading, investment, commercial or other decisions based on or made in reliance of the Omdia Materials.