The New Era of Intelligent, Modernized and Connected Networks by CSPs

Communications, Media & Information Services

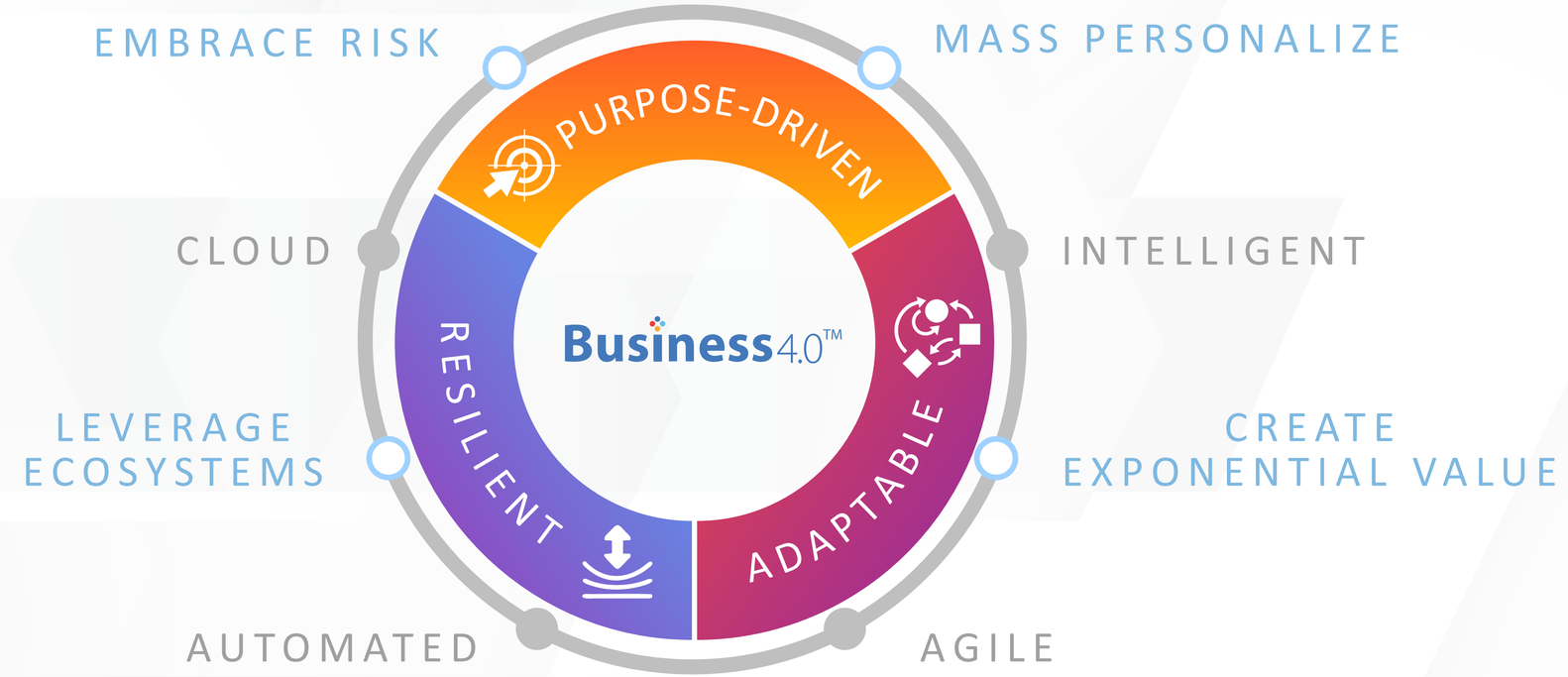
PURPOSE-DRIVEN

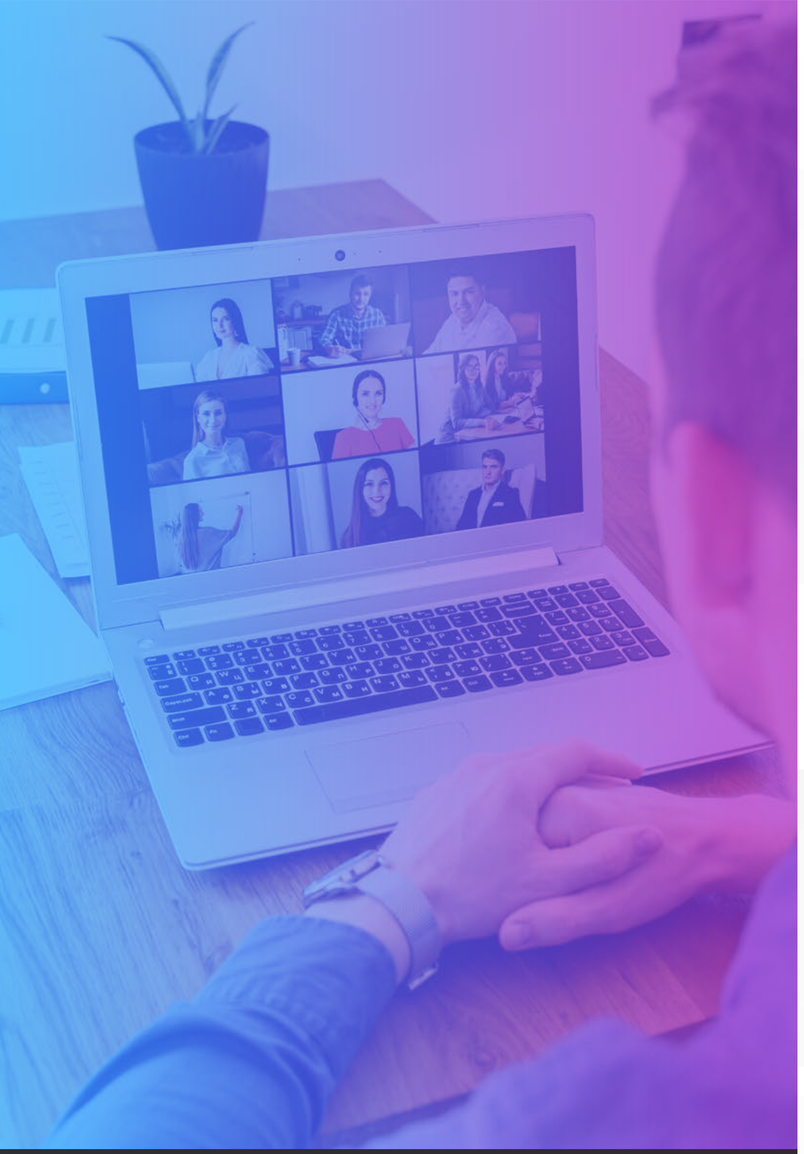
RESILIENT

ADAPTABLE

PURPOSE-DRIVEN, RESILIENT & ADAPTABLE

with Business 4.0™





PURPOSE-DRIVEN

RESILIENT

ADAPTABLE

Executive summary

The disruption caused by COVID-19 has unveiled numerous opportunities and challenges for the communications industry. Communications Service Providers (CSPs) have no choice but to maintain critical service availability due to a significant surge in demand. Given the urgent requirement to ensure safety of the public and of health care workers, robust and reliable communication infrastructure is the need of the hour. Leading CSPs have accepted the challenge by swiftly adapting to new ways of working with innovative tools and technologies. They are reimagining and innovating to make available next generation workplaces that are secure, borderless, connected, intelligent, and pervasive. Connectivity today has come to encompass resilience, elasticity, remote programmability, security and access agnostic last mile availability. This paper discusses how CSPs can achieve this end state.

The COVID-19 change imperative

With the sudden shift in work and life paradigm caused by the pandemic, the need for connectivity and associated network resource consumption patterns are changing significantly. While data consumption, and multi-party voice bridge calls from residential areas have seen a surge, revenue from roaming connections have dropped significantly. The criticality of mobility and stable handoff has gone down, while reliable, secure, fixed, high-speed broadband is growing in importance. The increase in video traffic has led to the re-configuration of network circuits for interactive video experiences. More importantly, endpoint security for residential users has become critical as they access enterprise applications from home.

For Network Operations Center (NOC) teams the impact includes exponential increase in the number of incidences and service requests. The time required for fault resolution and capacity triaging has increased multifold as the NOC expert, field engineer, and SME lack the right collaborative multimedia solutions while working remotely. The lack of secure access to knowledge management and case-based reasoning tools are adding to the delays. Telcos are also realizing that complex functions such as network troubleshooting and cross-domain correlation need to be automated.

Speed dialing to the new reality

Telcos that have successfully adapted to the changing requirements share a common set of capabilities that enable insight driven, remote and automated network operations, as shown in Figure 1.

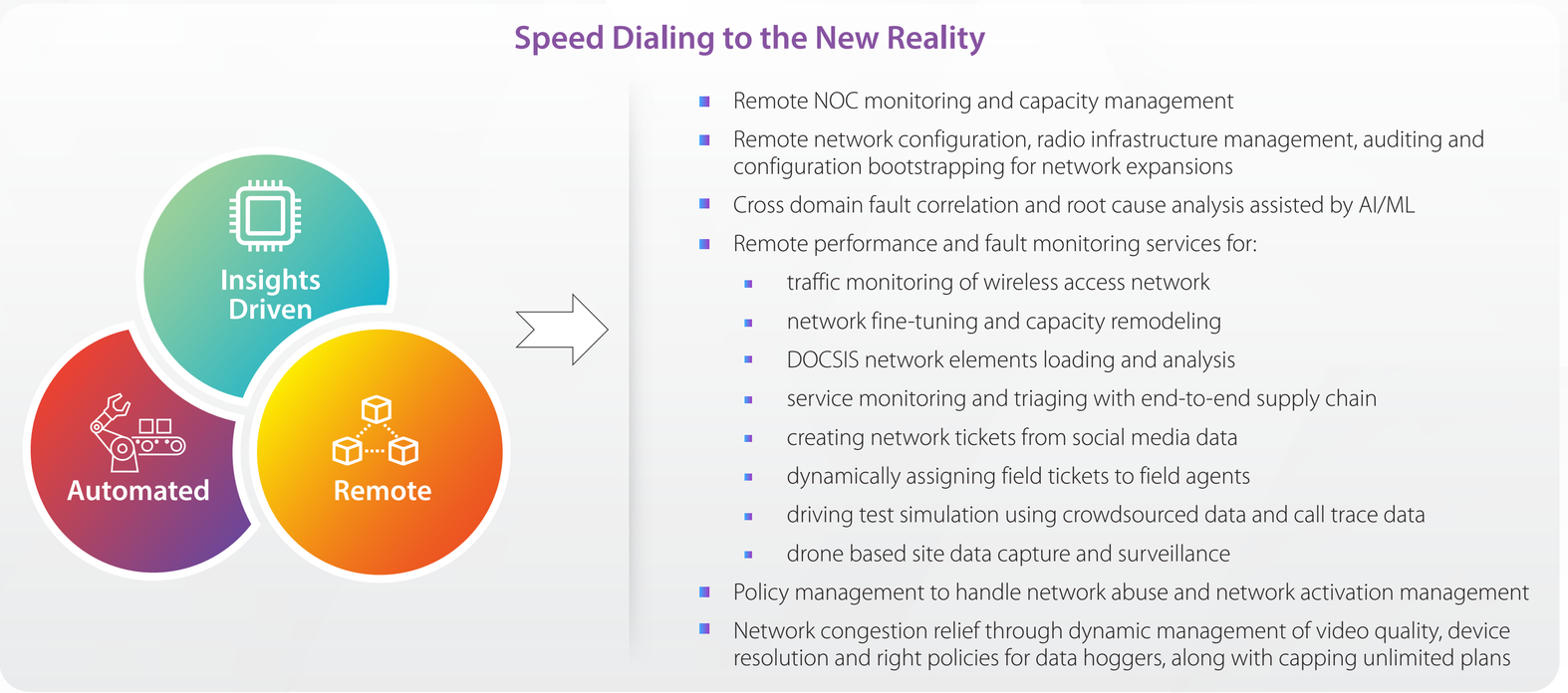


Figure 1: Adaptable telcos share common capabilities

However, quickly building these capabilities in an agile manner can be really daunting for operators, given the proprietary nature of technology provided by diverse OEMs. The problem turns complex when operators lack a unified view of their network inventory, configurations and topology due to multiple network expansion cycles. Tactical and script-based automation/ RPA seems to be the way forward for operators as a quick action.

Future-proofing with a resilient network

To build resilience, telcos are evaluating their network structure and operations. A transformed network infrastructure layer and design of the operations are obvious solutions. Newer technologies, such as AI/ML need to be leveraged deep into the infrastructure layer to build an elastic, programmable framework. This will deliver advanced capabilities, such as adaptive scaling and self-healing, as depicted in Figure 2 below. The operational processes and Operational Support Systems (OSS) platforms are also leveraging AI/ML extensively to build a cognitive operations platform.

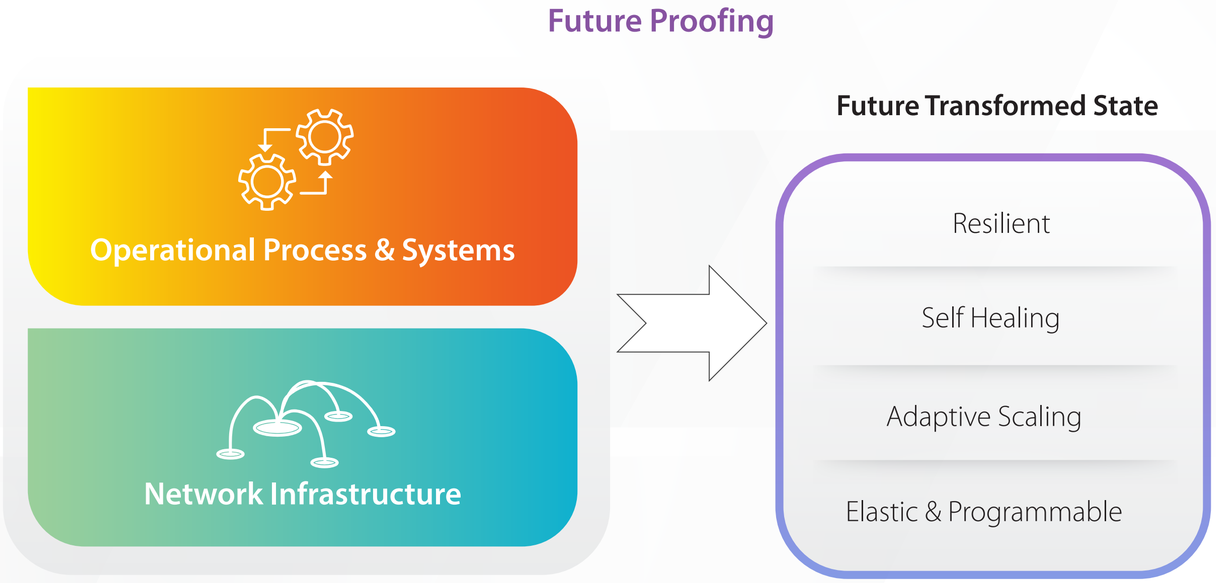


Figure 2: Future proofing of telcos

(i) Transformation of the network infrastructure layer

Here, operators require an accurate and inclusive evaluation of the existing telecom infrastructure both for Inside Plant Infrastructure and Outside Plant Infrastructure.

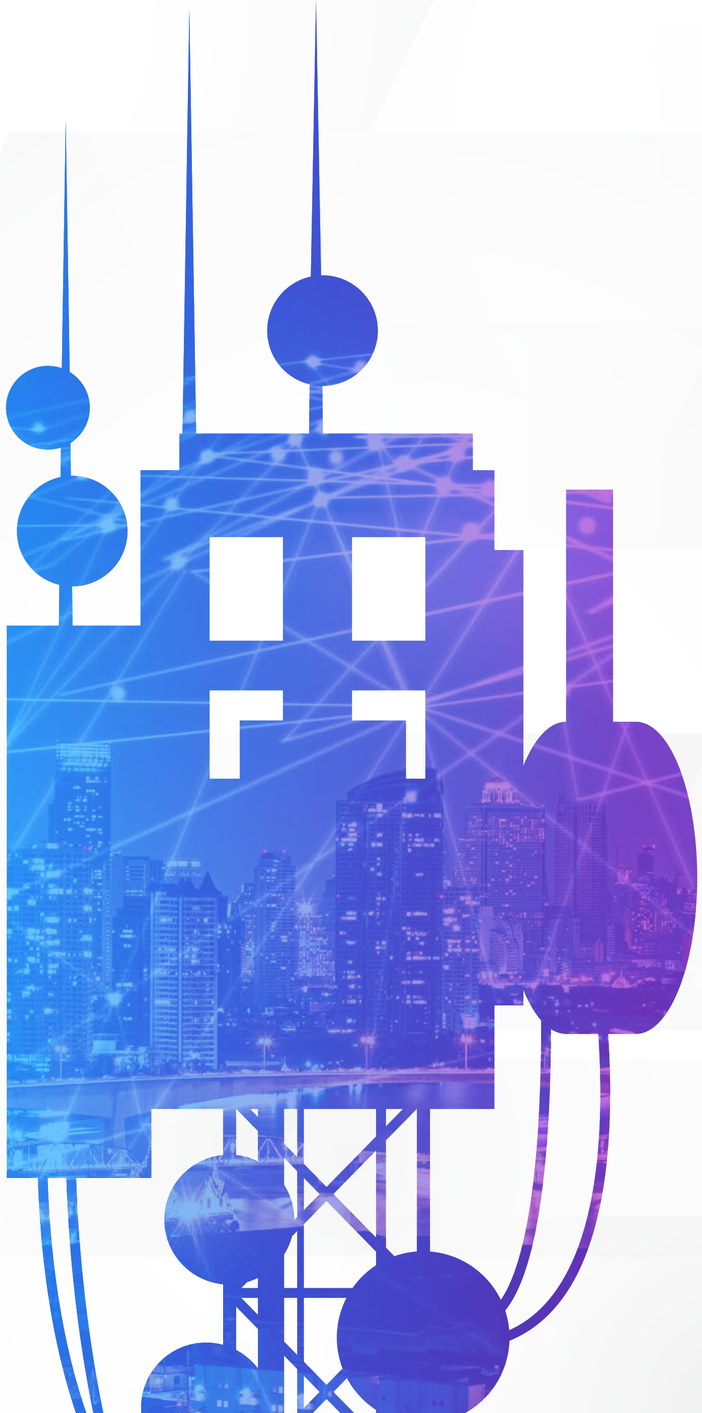
Inside Plant Infrastructure i.e. Core, aggregation and edge

Next gen network core requires significant transformation at the network layer to build secure, elastic, intelligent, resilient, and pervasive infrastructure with the ability to self-heal. Given the advent of 5G and complementary technologies such as IoT/sensor infrastructure, most operators are planning the transformation at the network layer. The current situation would only fast-track this journey.

Network transformation, to build next gen workspaces, would require the following to be addressed:

- Parting the control plane and data plane
- Dynamic capacity expansion at the infrastructure layer
- Policy based network routing and congestion controls (time-based, role-based, geo-location-based, content metadata-based and content-based)
- Seamless connectivity to other operators' infrastructure through well-defined APIs as prescribed by Network Exposure Functions (NEF Standards) cloud native network stack components
- Flexibility in the network stack architecture to ensure vendor neutrality, open source choices and deployment options (Core vs. Edge) to deliver lower latencies
- Closed loop feedback to accommodate AI/ML based learning and maturing to self-healing
- Stronger security mechanisms
- Moving intelligence closer to the consumption edge in order to deliver the expected customer experience

For most operators, such a future ready flexible network would require a Service Oriented Architecture (SOA) based integration to create a plug and play capability across all layers of the softwarized network stack. This architecture is guided by industry standards defined by leading standardization bodies, such as The Linux Foundation, Open Network Automation Platform (ONAP), European Telecommunications Standards Institute (ETSI) Management and Orchestration (MANO), TM Forum Framework (eTOM, SID, TAM) and Metro Ethernet Forum/ Lifecycle Service Orchestration (MEF/ LSO). The inspiration, provided by these state-of-the-art standards, helps shape the disruptive, agile, flexible, on-demand and multi-tenant new age programmable network



Outside Plant (OSP) Infrastructure i.e. CPE, Fixed Access, RAN, Satellite comm.

OSP, with the largest CAPEX/ OPEX investments, uses Multi Technology Mix (MTM) for network expansions of most large and brownfield operators. However, globally, operators are replacing their copper and Hybrid fiber-coaxial (HFC) infrastruture with fiber. This compliments technology, such as 5G. Telcos also deploy fiber for front and back haul of new 5G network.

Operators are participating in interesting programs where CPEs are being replaced with standard hardware; intelligence is being pushed from the core to the CPE as a virtual CPE Image (vCPE). This significantly reduces the cost and improves manageability and security.

(ii) Transformation of operational processes and systems

Given that a future ready network infrastructure layer would require a software network stack sitting atop a vendor neutral virtualized cloud native infrastructure, the OSS would look a lot different than the current OSS systems. Directionally, we are seeing a clear shift towards building a converged operations platform, where choosing a common virtualization technology is key.

Automation, as a central theme, drives most of these initiatives with an objective of transforming the reactive, fault-correlation based operations to cognitive and prescriptive AI/ML based operations. These operations platforms gradually mature into zero touch operations centers or the dark NOCs with zero human intervention while operating a future ready network.

Innovating for the future - engineering new age service platforms

While the transformed network infrastructure delivers on the goals of elasticity, programmability, manageability significant agility in operations, it also opens the network for creating new age services that can serve as new revenue streams for telcos. As an example, companies are engineering a holographic presence and collaboration experience solution for 5G infrastructure using existing components that render AR/VR-ready collaboration across diverse endpoints. Intelligent field services platforms allow immersive collaboration experiences among the design and field engineering teams across continents. This creates a very strong differentiator for the operator as a value-added partner rather than just a reliable bitstream carrier. Some other examples are outlined in Figure 3.

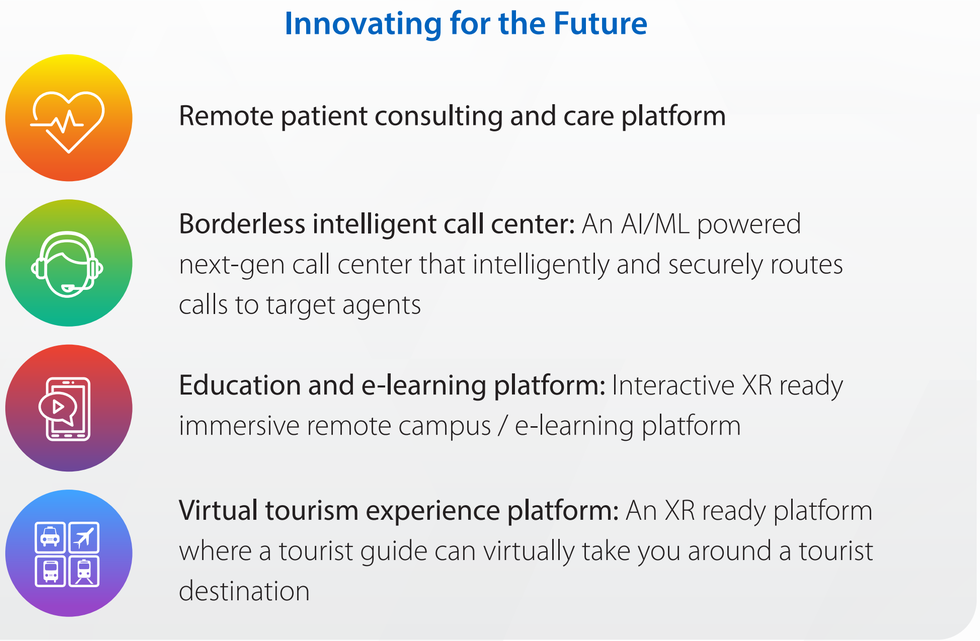


Figure 3: Innovating for the Future

Operators would require a culture of innovation to continue to build and eventually monetize investments on many more such platforms for enterprises across different domains.

Forging ahead with innovation and agility

With the unprecedented increase in network consumption due to COVID-19, telcos need to operate their networks with enhanced levels of resilience, performance, and security to deliver always available, and responsive communications infrastructure. The solution lies in considering a revamped infrastructure, OSS or service platforms. Operators are working towards this solution, underpinned by transformed SDN-ready elastic and intelligent network at the heart of this reimagination. The winners will be those who balance innovation and agility with stability, speed and security.

About the author

Vimal Kumar

Vimal Kumar is the Global Head for Network Solutions Group (NSG) within the Communications, Media and Information Services (CMI) business group at TCS. With over 26 years in TCS as an industry advisor, Vimal brings in strong domain knowledge, product engineering experience and cross-industry best practices. He holds a bachelor's degree in Computer Science Engineering from the Netaji Subhas Institute of Technology, Delhi, India.

Contact

For more information on TCS' Communications, Media & Technology, please visit https://www.tcs.com/communication-media-technology

Email: global.cmi@tcs.com

About Tata Consultancy Services Ltd (TCS)

Tata Consultancy Services is an IT services, consulting and business solutions organization that delivers real results to global business, ensuring a level of certainty no other firm can match.

TCS offers a consulting-led, integrated portfolio of IT and IT-enabled infrastructure, engineering and assurance services. This is delivered through its unique Global Network Delivery Model™, recognized as the benchmark of excellence in software development. A part of the Tata Group, India's largest industrial conglomerate, TCS has a global footprint and is listed on the National Stock Exchange and Bombay Stock Exchange in India.

For more information, visit us at **www.tcs.com**

Corporate Marketing | Design Services | M | 06 | 20

PURPOSE-DRIVEN

RESILIENT

ADAPTABLE