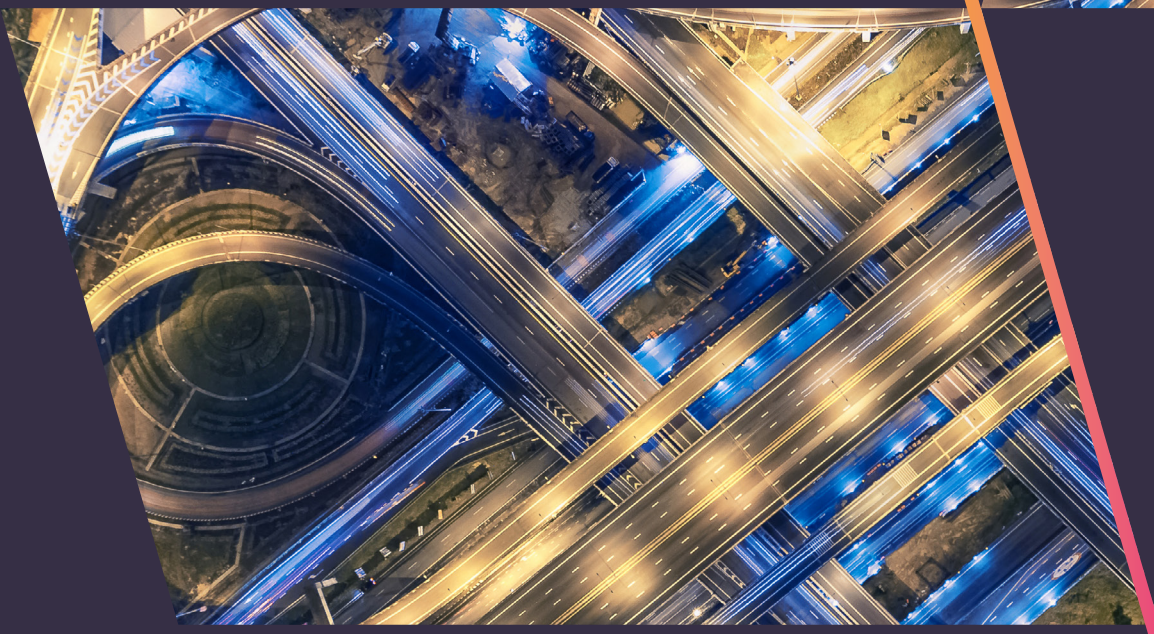


it's time to modernize your legacy inventory systems

Are your network data platforms ready to support 5G and NaaS?

amdocs

why is inventory modernization critical?

1. Automated operations demand fast access to network data

With the rollout of 5G and NAAS, service providers need to differentiate on speed of deployment, quality of service and cost. They can only achieve this differentiation by automating network operations. Automated operations require instant access to end-to-end, accurate network resource and service data. This data is held in the network inventory database, making it absolutely essential for automation. However, many service providers have legacy inventory systems that are not fast enough to support widespread automation.

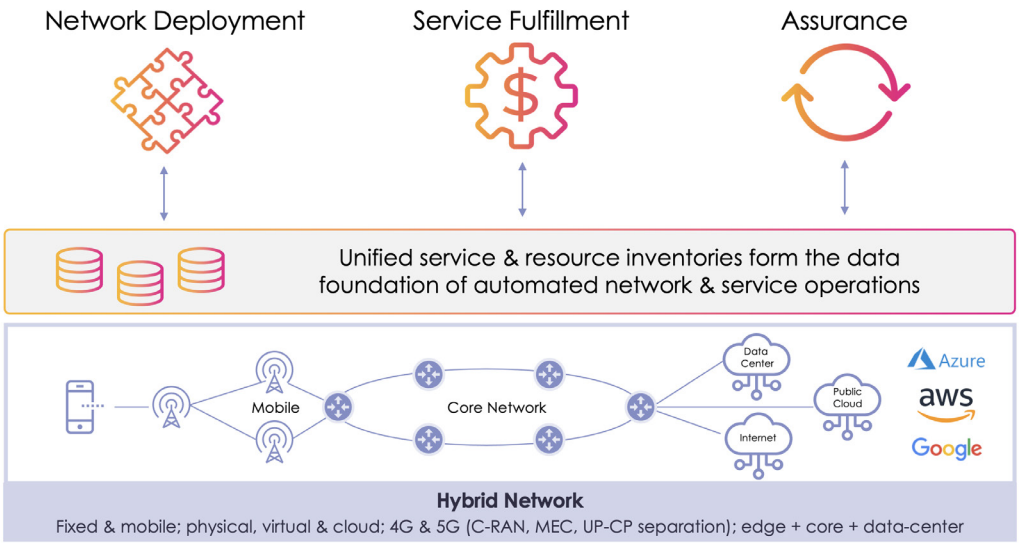


Figure 1: The role of inventory systems

2. Your inventory system needs to be cloud-native

Legacy inventory systems are also typically limited to on-premise operation and are not scalable. Deploying a cloud-native inventory system on a private or public cloud enables lower total cost of ownership, higher agility, zero downtime and the ability to easily scale the OSS as the network grows. Cloud-native inventory systems are microservices-based and always-on. Furthermore, inventory models in a cloud-based OSS can be updated in real time, in stark contrast to previous generation inventory systems that need to be taken offline for model updates.

3. 5G networks require a highly dynamic inventory system

5G is generating massive change in the way networks are designed and operated. 5G networks are highly dynamic and operate with a large degree of automation. Accurate network data served almost instantly is fundamental to 5G network operation, requiring a dynamic inventory capable of tracking the always-changing 5G network.

A prime example of a specific network operation that requires detailed end-to-end network data is the automated decision-making process for 5G edge network function placement. Such a decision depends on multiple elements of inventory data, including the availability and location of compute and storage resources. In a modern dynamic network, automated decisions need to be made quickly, and can only happen if the requisite network information is instantly available.

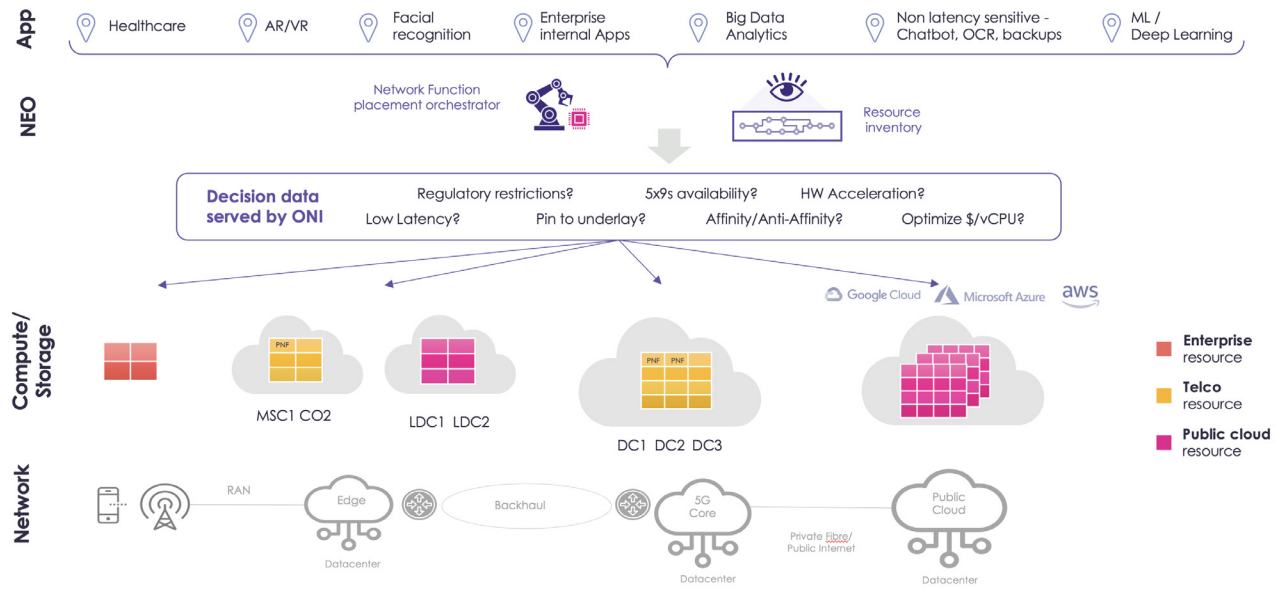


Figure 2: 5G Network Function Placement

Network slice management

Another example of 5G's heavy dependency on network configuration data is network slicing. To instantiate and manage a 5G network slice, slice management and orchestration systems must have access to the end-to-end network configuration, including the configuration of the edge, transport and core networks. It is important to emphasize that "configuration" refers to the configuration of the physical network, the logical network and the service overlay where slice services are described, mandating an inventory that is multi-dimensional in scope.

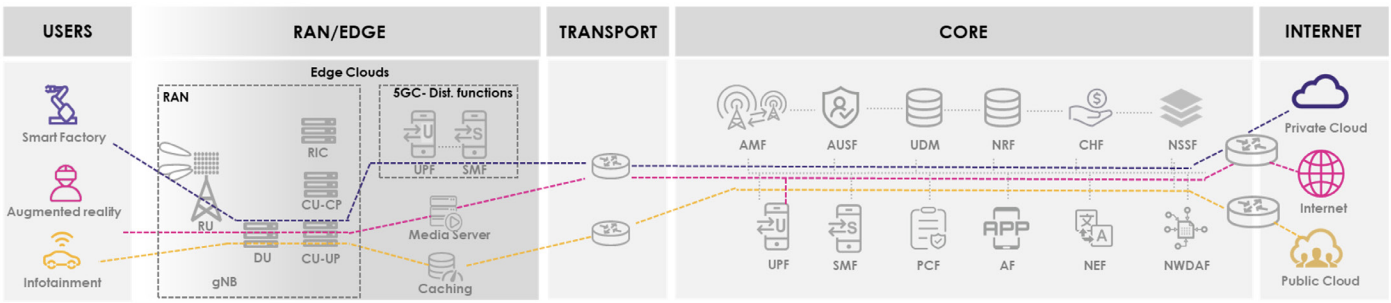


Figure 3: 5G Network slices

4. NAAS

5G is not the only network revolution taking place today. Network as a Service (NaaS) is a strategic technology-driven trend in which leading operators are achieving an unparalleled level of agility in the way they plan and launch new services, such as SD-WAN. Achieving such agility requires the same rapid access to multi-layered network data as the 5G use cases mentioned earlier.

5. Your network data is siloed, hampering operations

Clearly, the demands on inventory systems are increasing multifold, yet the state of network data systems at most service providers is far from being able to handle these new demands. The main reason is that network data typically is contained in multiple inventory data silos.

The number of these data silos tends to increase over a period of time, as companies add new network technologies, expand their networks and move into new lines of business, either organically or via acquisition. Each inventory silo has its own UI, unique processes and API. This means that automatic processes will have relatively high fallout due to the complexity of accessing data from multiple data silos in near real time. Furthermore, operations staff do not have an end-to-end view of the network.

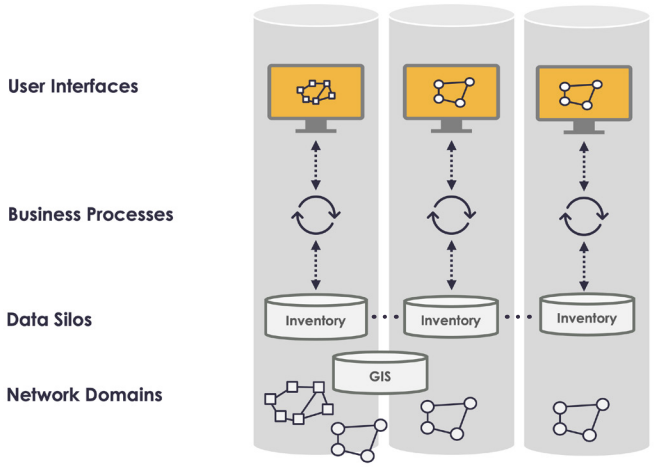


Figure 4: Typical accumulation of siloed inventory systems at a service provider

the 5 steps to a modern inventory system

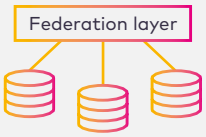
Previously, 'big bang' inventory consolidations were the method of choice to modernize inventory systems. However, a tailored combination of inventory federation and consolidation offers service providers a much superior and faster path to breaking down inventory data silos and modernizing.

Below are five steps for accelerating inventory modernization using a combination of federation and consolidation:

1. **Evaluate the existing inventory ecosystem**
2. **Modernize**
3. **Federate**
4. **Connect northbound systems to the unified data layer**
5. **Retire and consolidate legacy data sources**

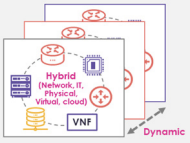
Steps 2 to 5 can be performed in any order that suits the service provider.

Step 1 – Evaluate the existing inventory ecosystem



Determine which inventory systems should remain active and be federated

Determine which inventory systems should be retired and consolidated (EOL or high adaptation cost)

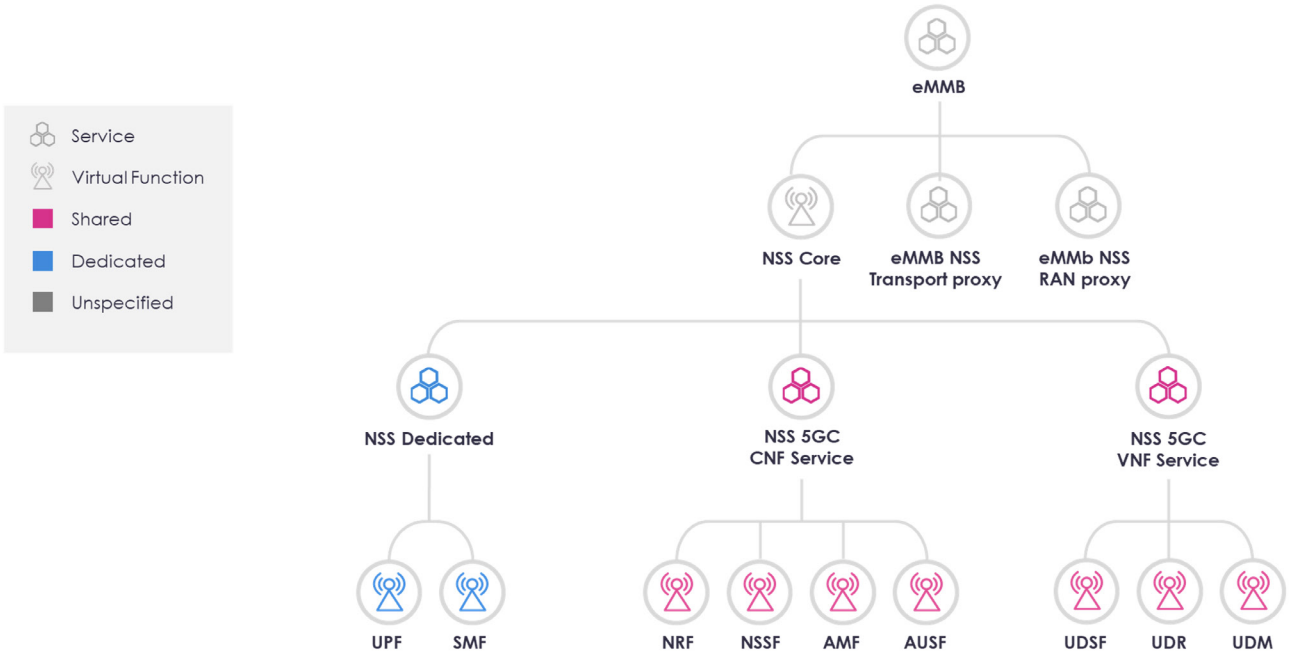


Determine if dynamic networks (5G, NFV, SDN) can be managed in an existing inventory system or if a new inventory must be deployed

Step 2 – Modernize

Management of dynamic networks such as 5G and network elements such as VNFs and CNFs, requires a highly dynamic inventory that can also provide multilayer network coverage from the service overlay to the physical underlay. The legacy inventories operated by most service providers are not sufficiently fast to manage these technologies, and typically provide incomplete coverage of one or more network layers. Service providers must therefore modernize their inventory systems to ensure effective management of new, critical network domains. Note that inventory modernization can be performed in parallel with inventory federation.

Amdocs Inventory leverages advanced database technologies, including graph, to provide real-time capabilities that enable support of even the most rapidly changing elements of today's dynamic networks. This includes comprehensive coverage of both the network service overlay and the physical network underlay. Below is a snapshot of the Amdocs Inventory UI, with a view of part of a 5G network. The view takes advantage of the synthesis of graph and non-graph database technologies:

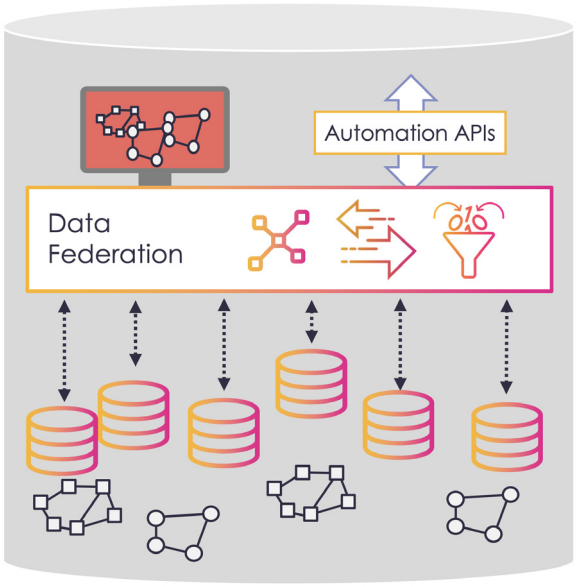


Faster metadata onboarding

Another critical advantage of inventory modernization is accelerated onboarding of new network functions and network element types, which can be performed in minutes rather than the days or months that were typically required to add new metadata to legacy inventory systems.

Step 3 – Federate

Another key element of achieving 5G and NaaS readiness is federation of the new inventory and the existing inventory data sources into a unified data layer. This is achieved by transferring and transforming data from the existing data sources into a standard, consistent format according to established meta-data models, and enforcing deduplication. The federated data provides operations staff and northbound systems with instant access to inventory data from across the network. The federation layer must also provide an advanced, visual data-driven UI for operations personnel.



Multiple types of federation running in parallel are needed

Different data sources have different characteristics and levels of dynamism, so an advanced federation layer must simultaneously provide multiple types of federation:

- Periodic asynchronous transfer into a datacopy. Appropriate for relatively static data
- On-demand data federation, initiated by northbound app. or user. Must-have approach for dynamic data – 5G, NVF, SDN
- Real-time data enrichment from multiple sources

Periodic asynchronous transfer into a datacopy refers to the loading of federated data into a dedicated database, regardless of any particular need. The importance of this type of federation is to minimize the amount of data that needs to be retrieved on-demand.

On-demand federation refers to data federation that takes place only when an application or user requires the information. This is the necessary approach for dynamic source data that is always changing.

Real-time data enrichment refers to enrichment of network inventory objects that are already inside the federated inventory data but may require enrichment of particular parameters from external sources. This is needed when one or more attributes of an object are mastered in different databases. For example, a physical device and port are typically mastered in an inventory database, but the port status is mastered in a network management system. Data enrichment builds a comprehensive record of the object in one place by sourcing data about both the physical device and its status, and combining that data into one comprehensive record.

Meeting the real-world challenge of overlapping and inconsistent data models

Overlapping and inconsistent data models are commonplace in large inventory ecosystems that have evolved over several years. The same type of equipment may be modelled in a different way in each inventory system. This can 'fool' unsophisticated federation systems and cause data duplication. An advanced federation platform will perform a data mapping so that network elements are mapped into a common data model, and deduplication can take place automatically.

The availability of all of the above federation capabilities enables a tailored and comprehensive approach to federation that meets CSP's needs and maximizes the benefits of federation using the right approach for each type of inventory data.

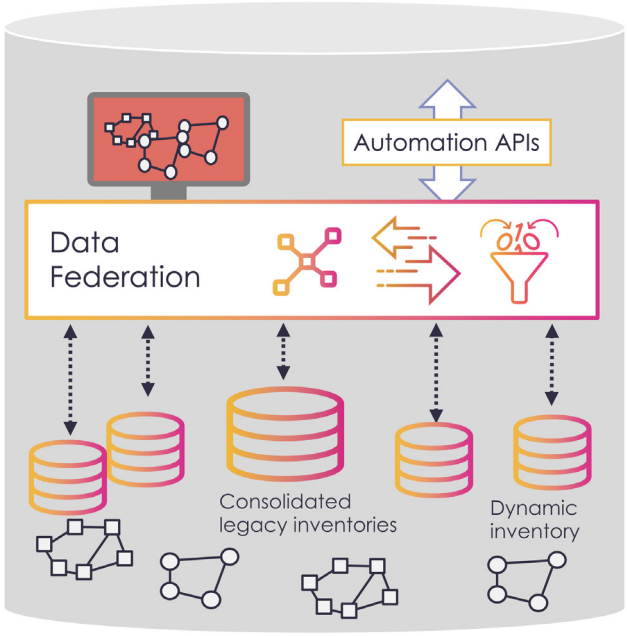
Step 4 – Connect to the unified data source

With the federation layer in place, the service provider can connect its inventory data sources. To facilitate and accelerate this process, Amdocs provides a comprehensive range of standard interfaces, including TM Forum Open APIs such as 638 for service management and 639 for resource management.

Step 5 – Consolidate and retire end of life systems

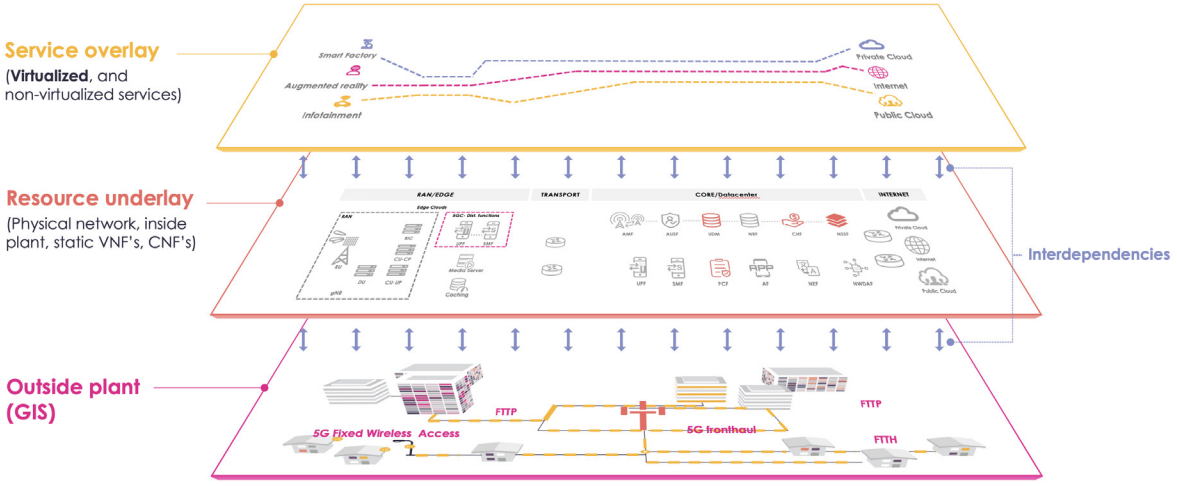
The last step in the modernization process is retirement of legacy inventory systems, and migration of their data into one of the newer inventory systems in the ecosystem. Legacy inventory systems can be quite expensive to maintain and their maintenance and adaptation costs going forward may far outweigh the cost of retiring them by migrating their data into a newer inventory system.

Consolidate and retire legacy systems



End-result: a modernized inventory system

With a federation layer in place and an inventory system for dynamic networks deployed, northbound systems and operational personnel will have a full view of all network domains – from the service overlay to the resource underlay and the outside plant.



This comprehensive, multilayered network view accelerates all facets of service provider operations, from network deployment to service fulfillment and assurance.

case studies

North American Tier 1

Business need:
Eliminate operational efficiencies caused by multiple siloed inventory systems

Solution:
Inventory federation across eight inventory data sources

Results achieved:
Service deployment accelerated; average fault resolution time reduced

European Tier 1 – federated galaxy

Business need:
Eliminate operational efficiencies caused by multiple siloed inventory systems and end-of-life systems

Solution:
Inventory federation and consolidation across multiple inventory systems

Results achieved:
Operational acceleration of RAN modernization so high that opco decided to extend the federation layer to multiple opcos in its galaxy

European Tier 1 – service overlay federation

Business need:
Accelerate and streamline service fulfillment

Solution:
Inventory service overlay federation across multiple SBUs and acquired companies

Results achieved:
Acceleration of service fulfillment

about amdocs

Amdocs' purpose is to enrich lives and progress society, using creativity and technology to build a better connected world. Amdocs and its 26,000 employees partner with the leading players in the communications and media industry, enabling next-generation experiences in 85 countries. Our cloud-native, open and dynamic portfolio of digital solutions, platforms and services brings greater choice, faster time to market and flexibility, to better meet the evolving needs of our customers as they drive growth, transform and take their business to the cloud. Listed on the NASDAQ Global Select Market, Amdocs had revenue of $4.2 billion in fiscal 2020. For more information, visit Amdocs at www.amdocs.com.

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