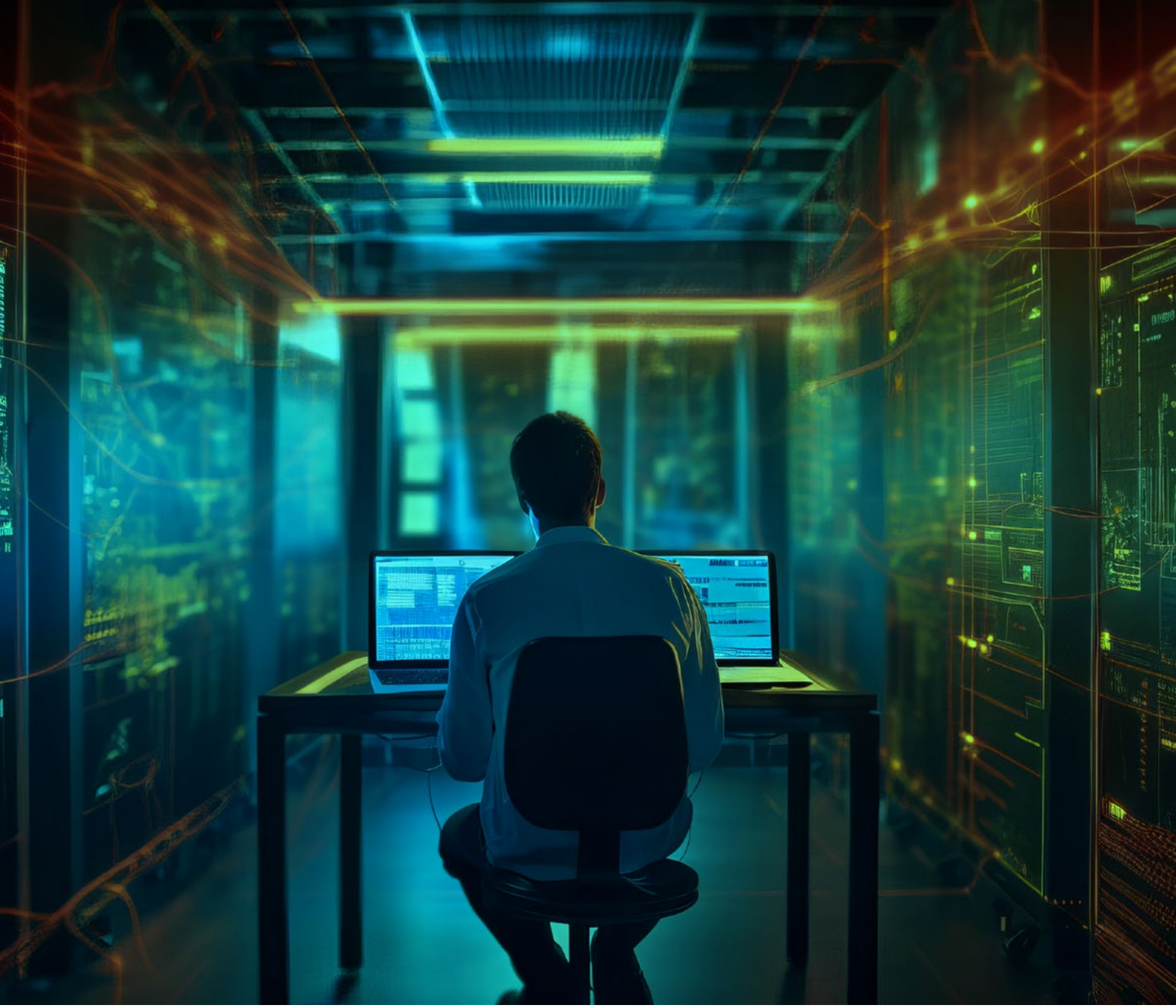
FNT

// simplify complexity

STRUCTURED CABLING IN DATA CENTERS:

FUTURE-PROOF CABLE MANAGEMENT WITH FNT SOLUTIONS



IN THIS WHITE PAPER:

In our previous white papers titled **The Nerve Pathways of Digital Transformation** and **Cable Chaos in Data Centers** we highlighted the strategic importance of structured cabling and how valuable it is to companies. The focus was on the challenges around planning and operating data center cabling, the consequences of inadequate cable management, and on how a professional software tool can take data center cabling to the next level.

In this third paper, we show how FNT specifically supports management of your data center cabling through a state-of-the-art software solution and decades of experience. After all, cable management is part of our DNA. Almost half of all DAX40 companies and more than 500 other major organizations around the world rely on our solutions to record, document, plan, and operate their critical cable infrastructures. Read on to discover how to future-proof the foundations of your digital transformation.

CONTENTS

PROVEN AND DEVELOPED OVER 30+ YEARS

Capabilities of FNT Cable Management

With increasing mobility, the omnipresence of social media, and the spread of IT into virtually all areas of private and work life, data volumes are growing exponentially. Accordingly, the operators of IT infrastructure in data centers face the urgent task of rolling out, expanding, transforming, and optimizing networks across a wide range of different technologies and topologies. Stability, speed, and efficiency are the key operational priorities here, alongside greater ease of planning.

FNT's Cable Management solution enables comprehensive documentation, planning, and management of passive network infrastructures, both within a company and across a campus. It supports all types of fiber, copper, and coaxial network topologies and all the deployed technologies. Integrated geo-referenced and schematic representations of the network infrastructure facilitate planning, impact analysis, and troubleshooting in the event of faults.

8 ARGUMENTS FOR MODERN CABLE MANAGEMENT

- Complete transparency into all physical and logical IT and telecoms networks and the associated services
- Reduced operating costs due to automatable threshold recognition and reporting
- Greater efficiency as a result of precision integration into existing processes
- Maximum uptime through better fault recognition and repair measures
- Higher quality due to detailed planning and documentation
- Fast access thanks to insight into infrastructure and services in a modular suite
- Peace of mind due to a strong focus on legal obligations (corporate governance)
- Less effort around compliance audits and audit preparation

MORE TRANSPARENCY

The FNT Cable Management solution gives customers complete transparency into their network infrastructures and the services that run on them, which is the prerequisite for efficient management and operation of complex infrastructures. Powerful functions cover all aspects of cable management in data centers, allowing you to stay in control of the network backbone at your individual locations and also between locations. Cable infrastructure management includes tray runs, patch management, and network port capacities. Using the tool optimizes lead times for changes to the physical network and speeds up support processes, thereby reducing network outage times to a minimum.

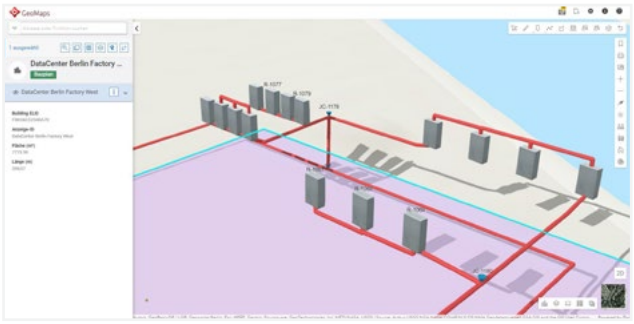
INSIDE PLANT MANAGEMENT

At the physical level, the devices in the backbone can be associated with the respective locations or buildings. The FNT solution includes an extensive configuration item (CI) or component library, with more than 75,000 devices and components from many different vendors. This library can be used to assign all relevant physical and logical resource information to each network node in the Network Resource Inventory. A graphical rack/switch cabinet editor provides extensive functions for network node management in the core. Plausibility checks based on card slot relationships, connectors, or device dimensions in the rack help prevent input errors. It is also possible to combine multiple devices to create single network elements that represent more complex pieces of hardware. In addition to active devices, all kinds of passive components, such as distributors, junction boxes, patch cables, configuration cables, trays, and ducts can be managed.

OUTSIDE PLANT MANAGEMENT

The FNT Cable Management solution also features full support for outside plant management, i.e., planning and management of all facilities and infrastructures in the field. The available functionality covers trays, tray sections, ducts, duct bundles, and nodes, including shaft images and the associated junction boxes and splice trays. All types of patch and configuration cables (fiber optic, copper, coax) can likewise be mapped for media-independent cable documentation and planning down to the level of individual optical fibers and their signal paths. Similarly,

all types of equipment and wireless links can be mapped. If required, the graphical representation of the network can be geo-referenced using FNT GeoMaps or displayed in the form of schematic network plans.



Cable trays in the building for connecting racks to the backbone

CABLE TYPES

FNT's Cable Management solution supports the documentation and planning of patch and configuration cables in inside and outside plant management. To enable this, the database that underlies the software contains all the standard cable types. It is thus possible to create a fully featured representation of the entire cable route between devices.

SIGNAL TRACING

Signal tracing allows fast analysis and tracing of signal chains. All devices and cables on the physical layer (in actual or planned state) are displayed schematically in the form of a block diagram. Different symbols are used to clearly differentiate between patch and configuration cabling. Key data for each connection can be viewed directly from the diagram or other modules opened for further processing.

CROSS-MEDIA AUTOROUTING

FNT Cable Management offers a cross-media autorouting capability that takes into account both the passive network resources and the active transport technologies. All kinds of physical and logical connections can be automatically routed through the entire network. The auto-routing function enables optimal routing of tray runs and cables, with the ability to specify extensive routing criteria, such as locations, trays, nodes, the number of switching points, and cable length. The additional patches and splices required are also considered and the necessary work orders automatically generated.

INTERNAL CONNECTIONS

Internal connections in active components and directors can be documented in detail. Logical connections are established between the A-side and B-side ports of each individual object, with any combination being possible. In addition to connection of at least two devices, internal connections within modular devices – e.g. directors – are supported while accommodating their special naming rules for ports and slots.

DATA MODEL

All FNT solutions are generally based on an integrated data model, which holds the physical, logical, and virtual assets and allows them to be analyzed. Managers enjoy full transparency across all the resources involved and all levels of the associated data center landscape – regardless of vendor and technology. The solution is underpinned by a single information database that automatically updates as changes occur. This means that even complex infrastructures can be managed efficiently.

DOCUMENTATION

Add-on functionality is available that allows the FNT Cable Management solution to be used to document and manage transport technologies. Whether it's OTN, DWDM or MPLS technology, TDM or packet data, FNT supports all network and communication technologies.

RESOURCE PLANNING

Another benefit lies in the planning of network and service resources. All resources and infrastructure components can be managed in both the actual and planned state. The functionality provided enables end-to-end planning of network and service resources, allowing changes to be handled in accordance with a controlled change management process. Work orders can be generated on the basis of this planning activity and used to implement the changes.

INTERFACES

FNT provides interfaces to a wide range of solutions from multiple vendors, such as trouble ticketing and fault management systems, order management and workforce management solutions, and ERP and BPM systems. We offer a SOAP-based web service API for process integration. Geo-referenced representations are vital for seamless documentation and planning of network resources in outside plant and cable management. FNT opens up access to up-to-date, correct resource information, combined with geo-referencing. This represents an important competitive advantage for network operations and planning.

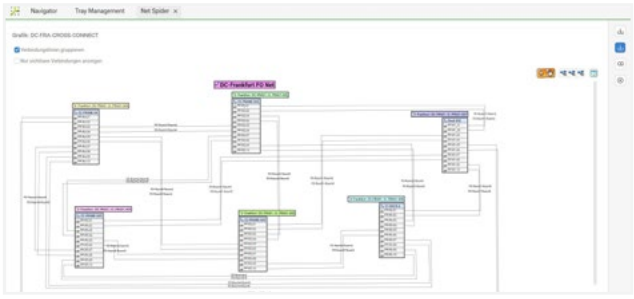
TRAY MANAGEMENT

From inside buildings in racks or ducts to outside in trenches, shafts or conduits, FNT's Duct and Trench Management functionality allows you to efficiently plan and

manage your cable infrastructure. Detailed, documented cable routes are also essential for fast analysis and rectification of faults.

All the functions required for comprehensive management and documentation of inter-regional tray infrastructure and the relevant building infrastructure are combined in the FNT Tray Management module. All cables can be assigned to specific tray sections and ducts and documented along with their geographical routes. It is also possible to automatically calculate utilization based on the number of cables in a particular duct. Easy-to-use routing mechanisms support the creation of complete tray and cable routes, including the ability to distinguish between main and secondary cable trays.

In addition, the schematic representation of shafts with views of all sides makes it easier to visualize and manage tray infrastructures. Individual nodes can be connected with other nodes using the tray section route. Nodes come in a variety of forms (e.g., shaft, mast, opening, building service entrance, continuity junction box, branch junction box, etc.,) and can be stored along with geographical information.



Schematic representation of the redundant connection of various network segments via a Cross-Connect

GENERAL FEATURES

FNT's solution for cable management in data centers is user-friendly, multilingual, multi-user, and multi-mandator capable and is based on a state-of-the-art software architecture. Our tools have a 30-year track record of use by enterprises, network operators, service providers, cell phone operators, colocation service providers, and governmental organizations across all key areas of managing telecommunications, IT, and data center infrastructure. The modular design allows organizations to start with the main challenges, focusing on current shortcomings and the most beneficial improvements. In addition, customers have the security of a future-proof solution that covers every aspect of infrastructure management.

SUMMARY

When it comes to capacity management and network expansion planning, the FNT Cable Management solution enables the best possible use of network capacity and leads to reduced, optimized investment in network infrastructure assets (CAPEX). At the same time, the necessary planning measures become faster and simpler, while keeping network resources and the associated costs under control at all times. This is due to the fact that:

- extensive planning functions in FNT Command allow end-to-end, efficient planning of network infrastructure.
- auto-routing functionality for trays and duct infrastructures enables optimal planning of connections.
- auto-routing functionality for cable infrastructure allows optimal automated routing, with work orders for the required patches and splices being created for the route automatically.
- cable, network, and service information is all contained in a comprehensive data model, providing a complete and consistent picture of the current situation as a basis for decision-making.

KEY FEATURES OF CABLE MANAGEMENT WITH FNT

- Documentation, planning, and management in a single tool
- A central data model to map all physical assets, virtual components, applications, and services – including all physical/logical connections and dependencies
- 100% transparency – from physical equipment to services
- Continuous end-to-end signal tracing across the entire cable infrastructure
- Extensive library of over 75,000 components from many different vendors in a realistic depiction, together with all their technical parameters
- Integrated geo-referenced and schematic representations of the network infrastructure
- Automated routing of connections for optimal runs
- Simple, fast troubleshooting in the cable network
- Comprehensive plausibility checks by the system on the combination of cable and connector types and maximum cable lengths to ensure high-quality planning and documentation
- Integrated process management for efficient management and monitoring of planned changes to the infrastructure – including sending work orders to service providers
- Documentation of WAN connections between headquarters, data center locations, and local branches, including vendor and contract management
- Extendable to cover the entire IT and DC infrastructure
- Extensive interface functionalities for automated data exchange with third party systems and simple data import from any other system
- Cloud-ready – can be deployed in the public cloud, private cloud, or hybrid cloud
- Available as a SaaS model for maximum flexibility in terms of timescale and costs
- Web-based application with a modern user interface based on HTML5 technology for the best possible user experience

MODERN CABLE MANAGEMENT AT A GLANCE

The benefits of a professional solution

Planning and documentation require considerable time and effort if there is no unified management solution in place – cable management is no different than any other discipline. However, the quality and accuracy of the existing recorded data is of crucial importance for improving operational efficiency, optimizing costs, automating processes, boosting service quality, and increasing customer satisfaction.

A detailed and comprehensive overview of the as-is situation is not only useful for operational purposes but also when planning changes, enabling tasks to be assessed in advance and the right action to be initiated. For example, IT managers and network planners can visualize the information stored in a central database and simulate the effects on services and customers.

Using the FNT Cable Management solution enables companies to increase the efficiency of their day-to-day operations, optimize their costs and process times, and to rectify faults faster. Cable infrastructure transparency is not an end in itself, it serves the wider business.

HOW CUSTOMERS BENEFIT FROM THE FNT CABLE MANAGEMENT SOLUTION:

- They gain full transparency into all active and passive cable resources.
- They centrally manage all physical and logical network and service resources.
- They get a completely web-based solution.
- They navigate across all levels and task-oriented user interfaces seamlessly, ensuring maximum user-friendliness.
- They boost the efficiency of their day-to-day operations.
- They find and rectify faults faster, thereby increasing customer satisfaction.
- They cut their operating costs and reduce process times.
- They get consistent documentation and planning based on up-to-date, coherent data.
- They integrate processes from planning through to implementation in the network.
- They optimize the use of infrastructure capacity and avoid unnecessary investment.

How companies use state-of-the-art cable management

The lowest common denominator in IT infrastructure is the cable, whether made of copper, silicon, or polymer. To take one example, it is estimated that the cables at Frankfurt Airport would stretch eight times around the world. Importantly, cables also provide the interface between the individual IT silos within organizations. They make it possible to bridge the gap between systems, enabling companies to deliver the speed, efficiency, and flexibility their business demands.

Below we show how some organizations use the FNT Cable Management solution, from documentation to planning and operation.

CASE 1 – TRANSPARENCY

For power and data cables alike, having a proper overview of the existing infrastructure is essential. One well-known automotive group uses the FNT management solution for all its cabling. Deploying this standard product creates transparency, thereby allowing fast action in the event of an outage and enabling efficient planning of network expansion.

The requirements for the new system were demanding. A graphical view of tray routes and switch cabinets was needed to provide rapid answers to critical questions. What's more, a graphical view of the switch cabinets had to show at a glance how full the patch panels are, the assignment of ports, and the rear of the cabinets. The status report, showing all the ports of a switch with the port number, patch information, and IP addresses, had to fit neatly on a standard page when printed, so that all the relevant information for replacement is available in the event of a fault.

The first step was to migrate the data center documentation – locations, devices, and network – to the FNT Cable Management solution. Step two saw the creation of data center footprints (using the Data Center Cockpit module), with the details being carefully verified through on-site inspection to ensure excellent data quality. Much more efficient analysis of the available data was then possible. Reporting options and the assignment list made it possible to measure data center utilization.

The strengths of the FNT Cable Management solution are particularly apparent in two areas: reliable infrastructure operation and expansion planning. At the planning phase, the system validates technical feasibility and checks whether the cable and connector types are compatible, for example, and whether the overall lengths are appropriate. The complete order management process – from planning through to commissioning – is managed and monitored transparently via a workflow. Location data, manufacturer data, and device data, along with details of port utilization and the connected devices (assignment list), are all fully documented. This information is essential for smart incident and change management.

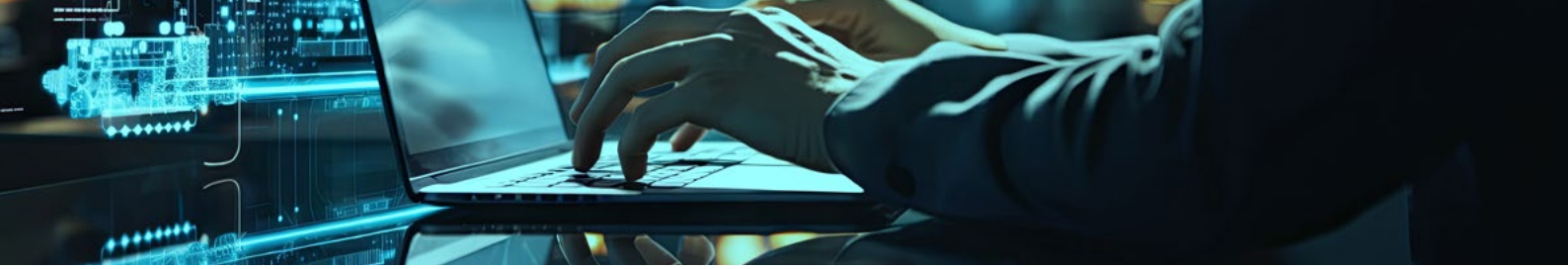
CASE 2 – PROCESS TIMES

NetCom BW operates a fiber optic network in Germany. The company manages a complex, disparate network that features a range of technologies, such as WDM, PDH, SDH, and MPLS, as well as a variety of vendors.

When transforming networks with new technologies and suppliers, transparency across all existing resources is a prerequisite. However, managing network expansion and outages was complicated and even harder to plan because the passive cable infrastructure, with its multi-vendor and multi-technology systems, was not fully documented and the information was split across multiple tools.

The ultimate aim was to standardize management of all network resources by way of a centralized solution and to improve planning processes around expansion of the passive and active network infrastructure. Another requirement was the ability to manage maintenance more efficiently and proactively, with faster and more direct impact analysis of any outages.

When implementing the FNT solution, the project team initially collated all the existing documentation from the



various systems, using standardized import templates where possible. This step revealed the true potential of the centralized database, providing the client with new insights into the existing data and data quality. The second phase of implementation saw the client beginning to standardize all existing systems in order to reduce the number of operating systems.

The results of the project are impressive. NetCom BW is achieving maximum quality and efficiency when planning maintenance windows, thanks to automated what-if analysis and associated redundancy information. Furthermore, e-mails can be generated directly in the FNT solution to inform business customers of planned service outages or to instruct technicians to divert connections for specific services.

Process times are down to under an hour due to having a coherent data source for all cable and service resources in the network. That's a reduction of a staggering 95 percent. This helps to avoid costly outages, with the staff at the Network Operation Center able to immediately identify the services and clients affected and respond accordingly to ensure that SLAs are not breached.

CASE 3 – DOCUMENTATION

An impressive terminal has been constructed on the Persian Gulf, with FNT working on the cabling since the planning phase of the new build. This early involvement boosts the quality of the documentation, and the operator benefits from having a comprehensive plan of the infrastructure.

But those behind the project were not just architectural visionaries; unlike in many similar cases, a new tender was issued for IT systems at the same time. Instead of the cable management software already in use at the airport, the FNT solution was chosen to provide documentation of the civil network cabling in the new terminal at an early stage. The tool was deployed at the planning phase and also during implementation and delivery of the building. The main benefit is improved quality: the operator possesses both printed and electronic documentation for the finished terminal, containing all the necessary information on the cables, plus measurement logs.

Documentation is particularly valuable to the client in terms of compliance and security, since it bridges the gap between the planned and as-built status. In contrast, automatic documentation procedures often fall short, because they fail to take proper account of the cabling plan. As an additional benefit, the customary reverse documentation is no longer needed. Since operation usually begins before the documentation is updated, many changes will typically have been made in the meantime, creating further problems.

Overall, the airport's IT management team looks after around 150,000 copper and 65,000 fiber connections, a data center, two central comms rooms, around 170 distributor rooms, and 1,000 racks within the terminal. The software is used in conjunction with an intelligent patch management system from CommScope to support optimization of patch management in the field. The client enforces strict monitoring to enable immediate intervention in the event of a problem. Medium-term plans include a link to the installations outside the building, such as the large parking lot. The installation is also being rolled out as a blueprint for the operator's other terminals and airports. Here again, the aim is to minimize any disruption of operations.

CASE 4 – PLANNING

An international industrial group and manufacturer of cable solutions – including for data centers – uses the FNT Cable Management tool to plan rollouts. Integration of the tool into the existing workflow provides a range of benefits and significant time savings for various groups, both within the organization and for its end customers.

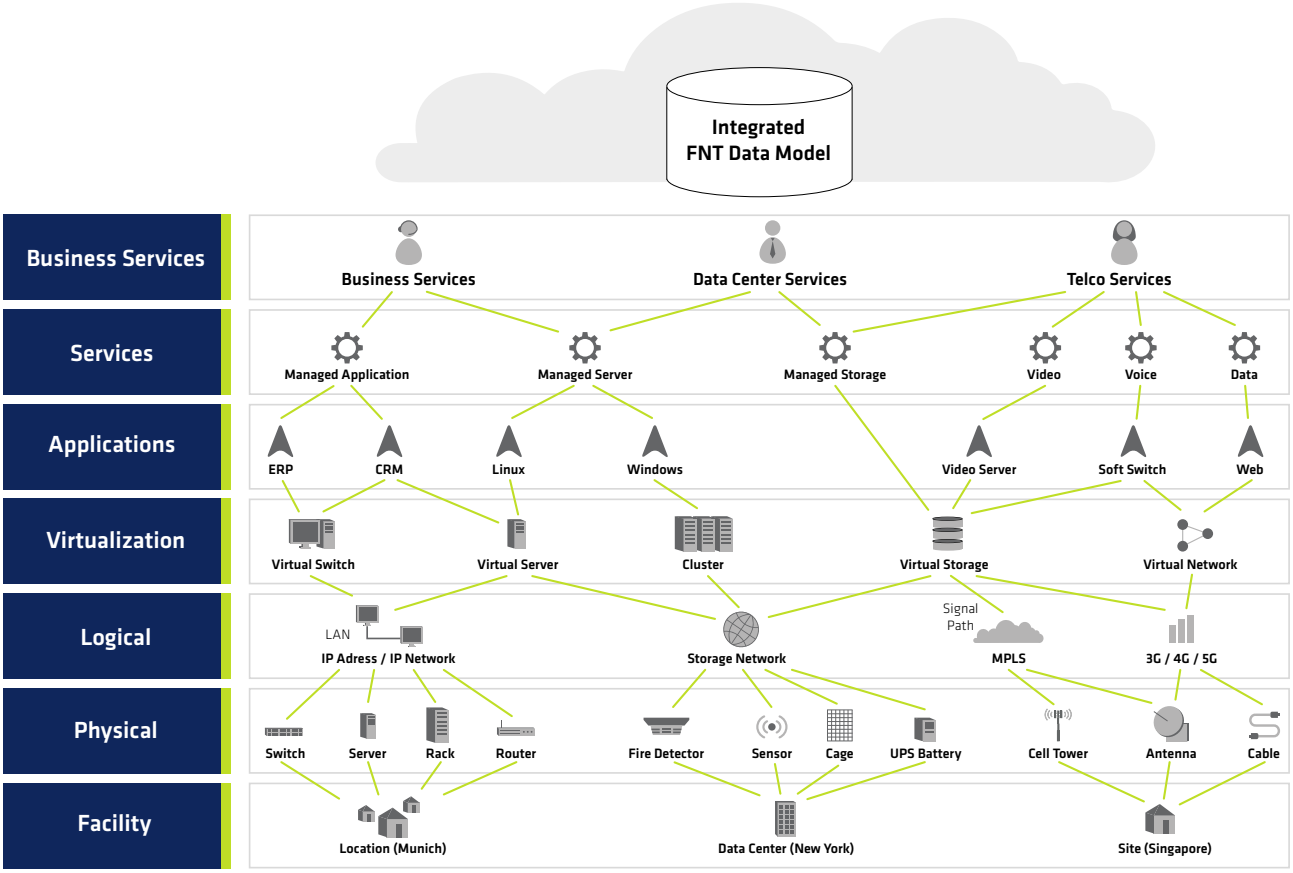
This deployment focuses on rollout planning for cable solutions on greenfield and brownfield sites for forthcoming construction projects (rip & replace). To optimize its own processes, the company plans the rollouts itself. The FNT tool not only shortens the design phase, it also allows immediate adjustments during implementation. The result is accurate and verified documentation of the cable infrastructure, which is in turn made available to the end customer. This makes communication with partners easier and faster.

The cable manufacturer's customer can use the technical documentation to plan and manage its own operating processes. Since the system has been validated, there are no gaps due to loss of information. This also reflects the fact that all documentation can be brought together in the FNT solution, from planning and test reports to certificates.

Do you want to increase the efficiency of your daily and accelerate costs and process times?

Learn more about FNT's Cable Management software.

FNT Command Platform:



Transparency at all levels: The FNT Data Model

FNT COMMAND PLATFORM – HIGHLIGHTS AT A GLANCE

- **Documentation, planning, and management of IT, data center, and network infrastructure** combined in a single tool
- **A central data model** to map all physical assets, virtual components, applications, and services – including all physical/logical connections and dependencies
- **100% transparency** – from physical equipment to services
- **Comprehensive component library** of over 75,000 components from many different vendors in a realistic depiction, together with all their technical parameters
- **Interface functionalities** for automated data exchange with third party systems and simple data import from any other system
- **Integrated process management** for efficient management and monitoring of planned changes to the infrastructure – including sending work orders to service providers
- **Comprehensive options for data visualization and analysis** allow faster, knowledge-based decisions
- **Cloud-ready** – can be deployed in the public cloud, private cloud, or hybrid cloud
- **Available as a SaaS model** for maximum flexibility in terms of timescale and costs
- **Web-based application with a modern user interface based on HTML5 technology** for the best possible user experience

About FNT

FNT GmbH, headquartered in Ellwangen (Jagst), Germany, simplifies the management of highly complex digital infrastructures in companies and public authorities with its FNT Command Platform. With the cloud-enabled "software made in Germany", IT, telecommunications and data center infrastructures can be efficiently recorded as digital twins and documented across all levels from buildings to digital services. The software also offers open interfaces and numerous functions for planning, implementing and automating transformations and changes in an integrated manner. FNT's customers include more than 500 companies and government agencies worldwide, including more than half of the DAX-40 listed corporations. FNT operates offices in several locations in Germany as well as in New York, London, Singapore and Timisoara and has an international partner system with market-leading IT service providers and system integrators.

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