Digital deployment

White paper
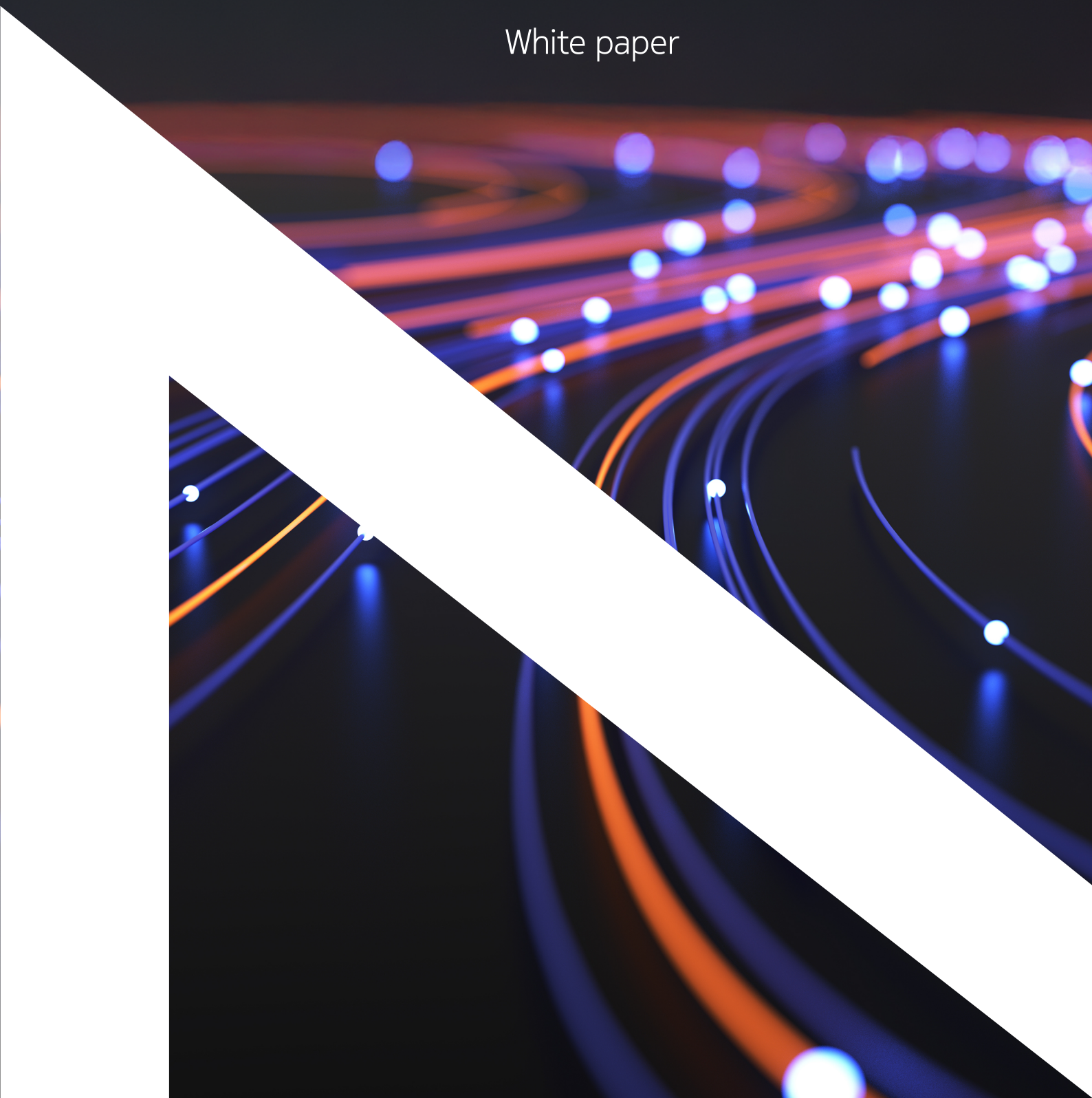
Contents

Executive summary

Network deployment projects are usually run on a hierarchical basis, focused on 'top-down' management of numerous stakeholders and rollout tasks. The project office must keep track of multiple versions of plans, drawings and documentation, in hard copy and digital formats, which is further complicated by the fact that documents and plans used in the field can vary greatly based on the needs of the site. To achieve a seamless delivery & execution of services, huge effort is, again, needed in project meetings to control processes and schedules, resources, tools and software media, often located in different parts of the world.

Adding to the complexity is the virtualization and cloudification of networks. To counter this, the delivery of services needs to be simplified, digitalized and made leaner to take advantage of information technologies.

Digital project orchestration makes network rollouts faster and more efficient, matching the agility that Communication Service Providers (CSPs) aspire to.

Nokia's network roll-out projects are now delivered via 'Nokia Delivery Platform' (NDP), a cloud-based orchestration and delivery management process. NDP allows precise planning and control of rollouts, based on business processes, existing systems and reporting requirements.

Furthermore, it allows numerous stakeholders to participate, based on the management of pre-defined access. The platform offers near real-time updates on project status, giving stakeholders the information they need to resolve issues down to the field level. Such an environment, combined with 'analytics' and 'digitalization', solves the challenges of complexity, whilst also helping lower the Total Cost of Ownership (TCO) of projects.

Enabling 'digital deployment'

Nokia's work with CSPs across the globe has identified a numerous common issues that affect site build quality. These issues arise from the fact that overall planning and execution of end-to-end site deployment is very manual and thus prone to errors.

Some examples include:

- Site survey planning and design stage – excessively long delays due to unavailability of a construction manager, or incorrect change requests based on faulty bills of material
- Materials management last mile logistics – delays due to incorrect or partial materials receipt at site, increasing crew's idle time
- Installation, commissioning & integration stage – inconsistent site build quality
- Site quality audit and acceptance stage – inconsistent close out packages requiring revisits to site

Nokia is tackling these rollout challenges with a unified and harmonized end-to-end services delivery platform. It replaces manual orders with overall project co-ordination and control, based on automated processes. This control applies across all resources, including field operatives, suppliers and third-parties. This provides field engineering teams with real-time data, allowing them to execute complete, rapid, endto-end, repeatable processes at scale to ensure efficient deployment. The heart of the NDP's digitalization of services delivery is built on orchestration engines, collaboration platforms and applications. It also makes use of centralized expertise centers and remote services delivery enablers, as well as extreme automation, analytics, robotics and artificial intelligence.

A typical mobile network delivery project involves stages comprising planning, surveys, design, logistics, acquisition, construction, implementation, commissioning, integration, testing and acceptance. It uses various enablers to digitalize the delivery process. Nokia NDP covers the whole lifecycle of the deployment.

![Nokia]

Automating the roll out process: digitalizing every step is the key

Nokia's digital deployment helps CSPs achieve faster, more flexible and efficient roll outs, brings transparency in every phase of the project and is future ready, with multiple delivery models for deploying new technologies. Using extreme automation, NDP cuts network deployment time by up to 30% by automating the planning, project management and field operations processes. The benefits are:

- Reduced end-to-end site deployment times

- Higher site completion rate

- Better build quality

- Improved view of project status

Figure 1. Features of Digital Deployment

| E2E workflow orchestration | Process automation | Material management | Advanced analytics |

Digital project management: Digitized order preparation, Planning, execution and monitoring

Order management

| Demand planning | Site acquisition | Technical site survey | Permit | Design | BoM & BoQ | Material tracking | CW | Install | C&I | Self assess-ment | Audit | Acceptance |

Project management

Digitized forecasting: Speed & accuracy

Digitization & automation: Efficiency, accuracy, site re-visit reduction

BoM / BoQ change and re-order elimination, better accuracy

Automation for efficiency, control and accuracy

Automation & remotization: Control, accuracy & efficiency

Digitized communication and real-time reporting based on resource / organizational task flow

Multiple innovations show how digital deployment is becoming a cornerstone for rolling out the networks of tomorrow.

- **Designing the networks digitally** – using the power of analytics and big data and recreating the data lake to plan the network and make it ready for 5G use cases. The digital twin that is created as a result, is scalable, as it reduces the design time and also simulates the network's future demand. Another possibility is using drone enabled 3D site mapping to help generate accurate bills of material, which also results in automated data building and validation for the site.

Analytics simulating impact of various use cases in live networks

- **Digitalization of site surveys** - enabled via a combination of pictures and video content, reviewed by a remote expert offline or in real time. These are converted via smart applications to 2D and 3D scale drawings and used for the redesign of a site. These redesigns are based on innovative model sites, arranged to accommodate modifications or upgrades due to network modernization.

- **Digitalization in site acquisition** - is enabled via activities and milestones embedded in the project delivery workflow, with links to the network planning and site survey process. Analytics is used to automate the assessment and selection of the best sites from the available options. Selection analytics, both for new and existing sites, leads to efficient leasing negotiations.

- **Data-driven site build orchestration** enables right construction crew, right site, right time with accurate materials management and last mile logistics, all based on lean processes. Also, site installers can be efficiently crowd-sourced, enhancing the speed and efficiency of delivery of specific tasks. Centralized 24x7 'expert enablement centers' provide real-time technical support to tasks at a site.

- **Video collaboration aids expert supervision and auditing** during site build and close-out. AR/VR can help achieve 'first time right' installation, cutting time and ensuring high build quality.

- **Digitalized Logistics functions** gather information on site requirements from surveys, project delivery plans and implementation. This aligns schedules, so that equipment, software and materials are ordered at the right time and covers all stages from international shipments to the 'last mile' logistics.

- **Digitized forms and video documentation** fast tracks site acceptance and automates invoicing. Using a unified project workbench with real-time updates, it drives transparency throughout the project delivery.

- **Remote Delivery Expertise** - to ensure guidelines are strictly followed. These cover health and safety norms, implementation procedures and quality checklists with associated documentation in electronic form, ensuring constant monitoring and checking of delivery activities.

- **'zero touch' and 'plug and play' commissioning** - Software upgrades and specific site databases for commissioning. These can be automatically downloaded, with equipment commissioning, integration and associated tests done via features, enabled in the equipment or implementation tools and process. This method of delivery enables 'first time right', high quality and error free implementation, eliminates human errors and the need for physical presence of expertise on site, achieving faster project delivery.

- **Digital acceptance** - enables access to relevant information in the form of video interfaces, drawings, checklists or performance parameters, offline or in real-time to approve of site(s) remotely in collaboration with multiple stakeholders.

Drones surveys and inspection

Workflow Orchestration
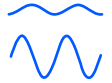
Analytics & Forecasting

Knowledge management

Collaboration & Mobility

Real time project Intelligence & Predictive

One Click Virtual Assistance

Automatic Configuration

Zero Touch enablement

Advanced Integration Capabilities

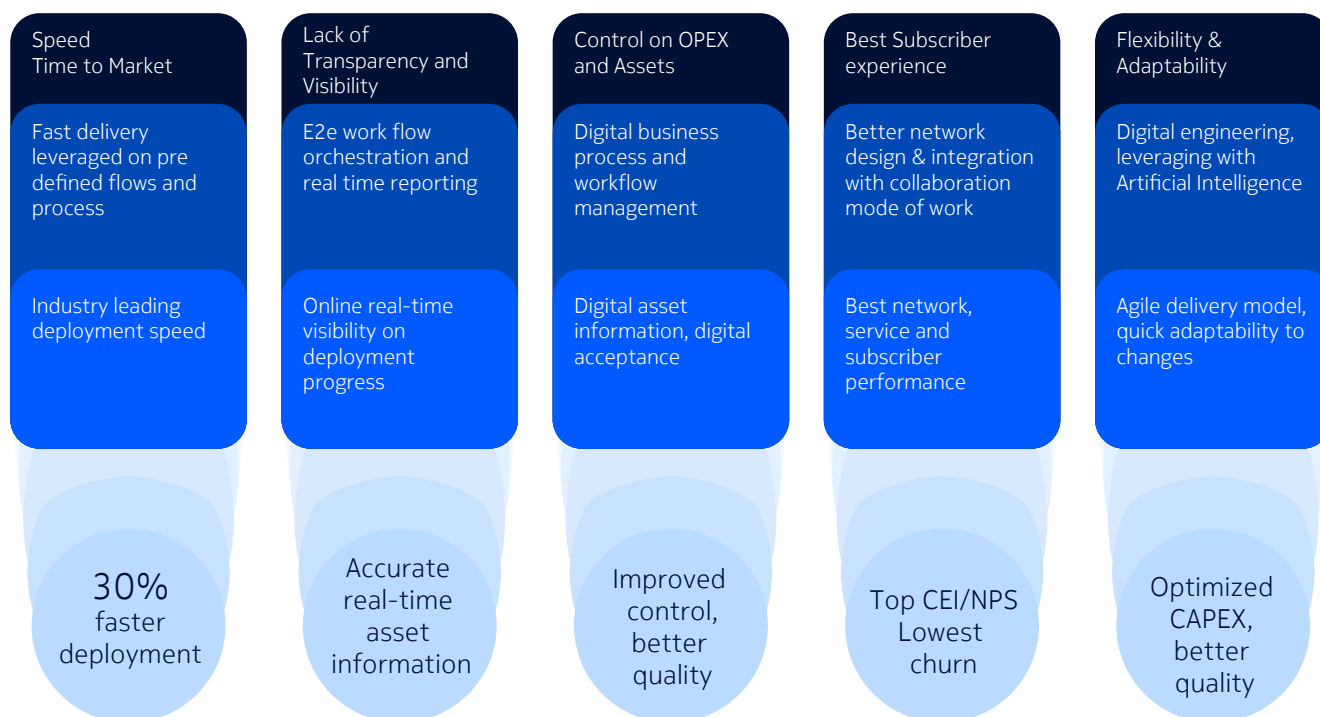Centralized expertise and remote integration

e-acceptance

Automated site test call

Digital Deployment has proven benefits

Nokia has implemented 'digital deployment' in real projects across the world, demonstrating the immense value and efficiencies it can achieve in services delivery.

Figure 2. Network rollout challenges and benefits of Digital deployment

Speed Time to Market	Lack of Transparency and Visibility	Control on OPEX and Assets	Best Subscriber experience	Flexibility & Adaptability
Fast delivery leveraged on pre defined flows and process	E2e work flow orchestration and real time reporting	Digital business process and workflow management	Better network design & integration with collaboration mode of work	Digital engineering, leveraging with Artificial Intelligence
Industry leading deployment speed	Online real-time visibility on deployment progress	Digital asset information, digital acceptance	Best network, service and subscriber performance	Agile delivery model, quick adaptability to changes
30% faster deployment	Accurate real-time asset information	Improved control, better quality	Top CEI/NPS Lowest churn	Optimized CAPEX, better quality

The future of 'digital' services delivery

Nokia's services delivery via 'digital deployment' will use 'extreme automation' and 'machine learning', paving the way for today's 'remote monitoring' of field activities to evolve and enjoy the full benefits of 'machine learning based automated control and delivery'.

Automated site surveys will support 'pre-approve/pre-reject' functionalities, greatly reducing the effort and lifecycle of surveys and associated approvals.

Site inventory database and management will use equipment recognition and count, producing automated measurements and 2D drawings.

Human monitoring of field activities, onsite or remotely, will evolve into machine learning based functions that identify defects in real-time through automated analyses of pre/post implementation pictures or video content.

Acceptance procedures will transform into fully automated processes that require no human interaction.'Digital deployment' holds great promise as the future of network deployment services, and Nokia is poised to play a lead role in this transformation, enabling simpler, faster, more efficient and higher-quality services delivery.

Abbreviations

AR   Augmented Reality

CSP   Communication Service Provider

NDP   Nokia Delivery Platform

TCO   Total Cost of Ownership

VR   Virtual Reality

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

With truly open architectures that seamlessly integrate into any ecosystem, our high-performance networks create new opportunities for monetization and scale. Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.