COMARCH

FULL PRODUCT OFFER FOR TELECOMMUNICATIONS

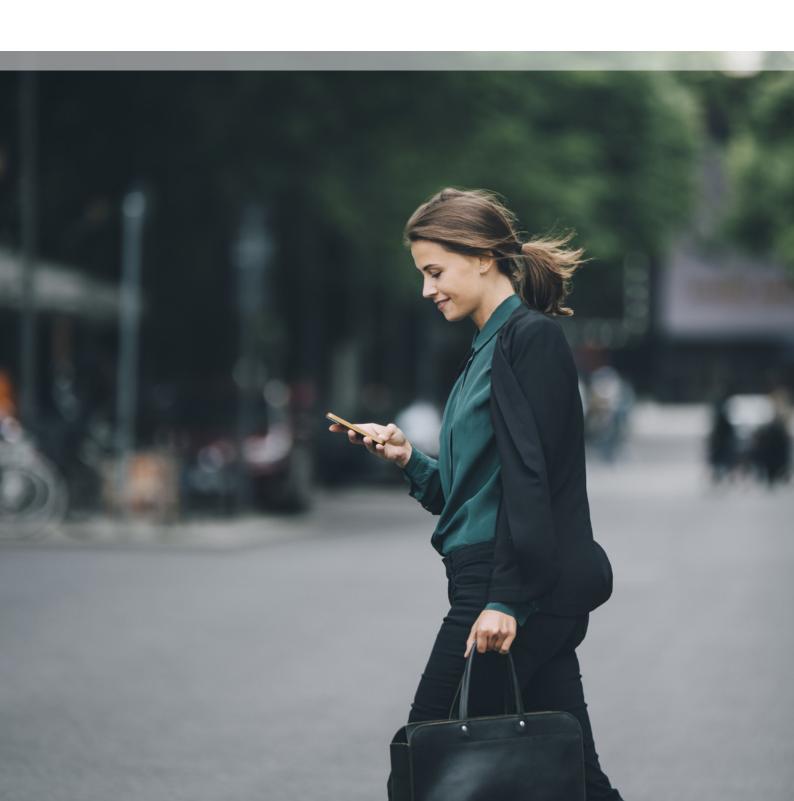


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COMARCH PRODUCTS INNOVATIONS YOU WANT, EXPERIENCE YOU NEED

Telecoms have helped to build the global supply chains. They have made constant access to information and instant communication a reality. Today, people and businesses across the globe depend on their mobile operators to provide them with innovative services needed in everyday life.

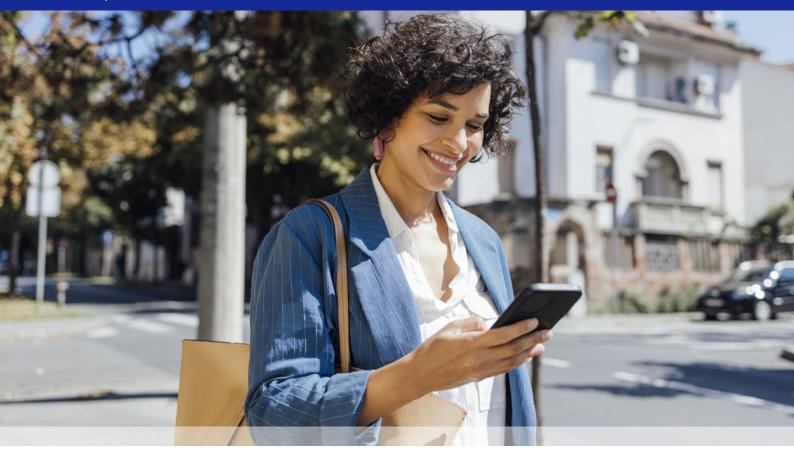
While the potential of innovative technologies such as 5G, AI and IoT is unquestioned, telecoms require IT tools to manage the digital processes and network operations that those technologies influence. Now is the time for key processes in your company to become automated and digitized, and to find the right partner to help you face the coming challenges.

Comarch, as an expert in telecom transformation projects, is there to support you. Since 1993, Comarch has helped many telecoms operators worldwide embrace new technologies and grow their businesses. We understand the needs of our customers, which is why we provide them with IT products that are highly modular, scalable and ready to support any future technology.

With Comarch you can simplify and automate 5G network operations, manage digital customer journeys, introduce and promote new kinds of services quickly and easily, raise customer engagement with loyalty programs, analyze daily operations with business intelligence, constantly improve your quality of service with intelligent assurance and analytics, and generate new revenues from cloud and IoT services in new verticals such as utilities, healthcare and logistics.

Our vast portfolio of IT products lets you automate and optimize any crucial area of your telecom business. Let us join you on the journey to a connected, digital world.

Choose Comarch to be your partner in the digital era. Let's shape the world of communications together.



At LG U+ we were using an OSS stack developed in-house.

The IT architecture was divided into silos, which entailed a number of challenges regarding the introduction of new technologies such as 5G and network virtualization.

The successful implementation of the comprehensive Comarch OSS platform enabled us to realize digital transformation and become a cutting-edge, customer-focused CSP.



Hokyung Kwon

NMS Development Team Leader at LGU+



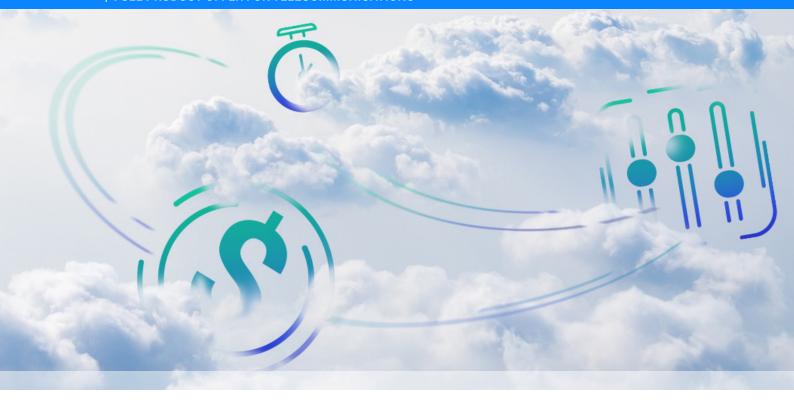


AI/ML-DRIVEN NETWORK EFFICIENCY

What is the key determinant of communications service providers' (CSP) position in the rapidly changing digital era? It is impossible to speak about innovative solutions without mentioning high-level network efficiency. If telecoms want to achieve even more, it is necessary to use BSS/OSS system supported by technologies based on artificial intelligence (AI) and machine learning (ML).

Comarch BSS/OSS systems support deep automation which helps reduce costs and shorten time to market (TTM). This is essential if telecoms want to improve services driven by 5G networks. Without a robust, future-proof and efficient network driven by AI/ML, it is not possible to take advantage of network slicing and other 5G benefits.

- Dynamic, AI/ML-based automation of network capacity management
- Reduced level of inefficiency thanks to a solution that adapts dynamically to your needs at any given time
- Increased network performance and scalability
- Improved network performance and service quality
- Improved customer experience with dynamic QoS management
- Shorter time to market, thanks to lower effort required for service design, development, and testing
- Better interoperability, based on up to date open standards and best practices



FULL NETWORK CLOUDIFICATION

Make a use of Comarch systems to easily conduct network cloudification. Operators are empowered to provide end-to-end visibility, management, and orchestration of modern telco clouds and networks. Gain a full insight into all layers, from services that are created for end-customers, to delivering powerful interfaces for creating new and designing currently available products and services. What is more, Comarch systems are ready to implement in different digital environments, from legacy servers to private, hybrid, multi, and public cloud.

Comarch products are also compile with key telco industry standards to integrate them with data centers or SDN controllers. The flexible system helps telecoms, tailoring the best services that address customers' needs and demands.

- Decrease TCO of network infrastructure
- · Reduce inefficiencies, thanks to a flexible system
- Improve time to market via rapid service design, development and testing
- Gain better network performance and scalability
- Introduce new types of tailored services for your customers
- Reduce downtime and increase customer satisfaction
- Benefit from better interoperability based on up-to-date open standards and best practices



COMPREHENSIVE NETWORK OVERVIEW

See what telecoms can achieve with a consolidated and consistent overview of the network. Comarch's portfolio contains an innovative product that helps to optimize performance and reduce costs. Equip telco business with a network-driven inventory and minimize the overall effort of maintaining an up-to-date network state. Improve customer experience by building and deploying reliable network-based services.

Achieve goals set by the growing market with the Comarch OSS system that enables comprehensive, multi-technology telecom network observability. With Comarch, telecoms gain up-to-date inventory, 5G network monitoring and advanced analytics. Using a single tool makes it possible to reduce the complexity of inventory environment and manage network technologies easily.

- Accurate and appropriate investment decisions based on a constant live view from the network
- Optimal capacity management
- A single pane of glass view for all vendors and technologies
- Unified network management and operations processes
- Automation
- Effective utilization of assets



5G-READY BUSINESS

The platform is based on 3GPP standards supporting network as a service (NaaS) and network slicing with full multi-tenancy, orchestration and monitoring, alongside private 5G networks and real-time inventory with dynamic network re-configuration, 5G network self-healing, and Al-powered 5G network management. To offer end-customers more tailored services, it is necessary to use a BSS and OSS system driven by artificial intelligence (Al) and machine learning (ML).

Comarch OSS/BSS systems support telecoms in increasing revenues and easily modelling services for end-customers and third-parties. They also maximize resource efficiency, helping to open up new markets for communication services.

- Monetize network slicing and NaaS with full functionality
- Deliver private 5G
- Increase the pace of innovation to bring new types of services to market
- Open up new markets
- Discover new and profitable business models
- On-board new technologies easily as they emerge
- Be ready to meet customers' demands and expectations



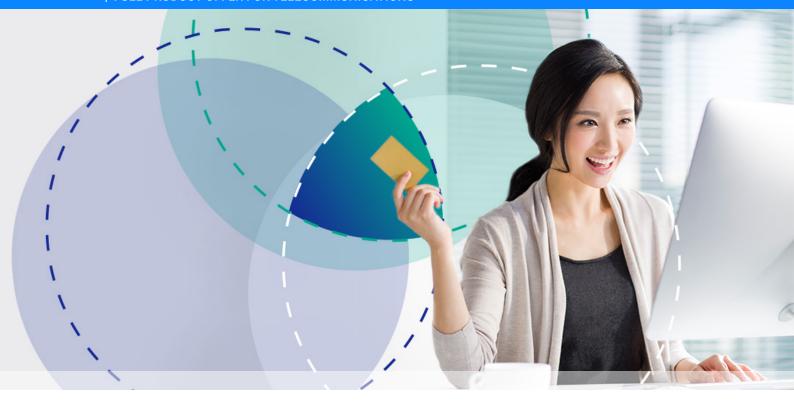
FUTURE-PROOF IOT BY DESIGN

Innovate telecom business with Internet of Things (IoT) monetization. Comarch's product was created to simplify managing IoT sales, billing, and customer and SIM management processes.

Communications service providers can now become IoT systems providers – as they can cover the whole value chain from connectivity and device management to offering IoT services such as smart factory, smart metering, asset tracking, services for other IoT verticals, and more.

What is more, Comarch's portfolio consists of IoT products that are the essentials of a custom-built IoT stack. It enables telco businesses to provide different solutions to end-customers, but also facilitate the creation of new ones, even better tailored to their needs.

- Achieve full SIM, device, and apps automation
- Gain flexibility to offer customized IoT connectivity and IoT solutions
- Apply the appropriate solution for each IoT customer and vertical
- Achieve the best time to market from IoT solution design to invoice
- Enable IoT self-service for all customers
- Get the most from a diversified portfolio and experience needed to build IoT strategy
- Offer vertical applications to your enterprise customers
- Sell manufactured devices according to your custom design



MONETIZING VERTICAL MARKETS

Boost telecom business and increase productivity and performance of all employees. Comarch's product offers multiple options of functionalities to easily leverage the company with a cloud-based, end-to-end system. A single platform enables building a total digital experience for various engaged parties, such as clients, prospective clients, product managers, financial controllers and service engineers.

A huge advantage is also an out-of-the-box (OOTB) form of this BSS system. Comarch's software was created to fully automate processes conducted by telecoms. Comarch's portfolio helps telecoms monetize vertical markets and is ideally suited to industries such as e-health, entertainment, insurance, airport services, education platforms, software sales and smart urban mobility.

- Customer-first approach
- Unlimited products and service variants with clear lifecycle management
- Hybrid approach to charges for customer services
- · Out-of-the-box configuration or tailored design
- Accelerated market entry or digital transformation with COTS product processes
- Decreased need to integrate various systems by using one, pre-integrated solution

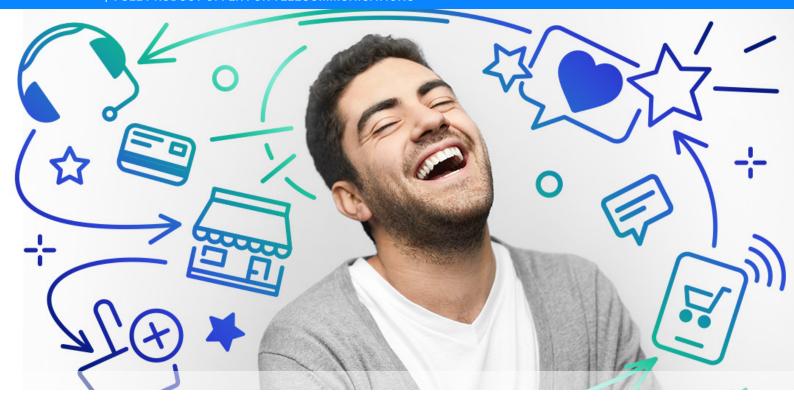


BORDERLESS INTERNATIONAL COOPERATION

Provide telecom business with international cooperation without any borders. Diverse culture, different language, various time zones, and currencies will no longer be considered as barriers for developing all telco-related companies' potential.

Comarch's product was designed to facilitate managing the complete lifecycle of partnerships, that includes onboarding, settlements, negotiations with all parties, and service activations. Thanks to that, operators can easily model any type of services and improve customer experience. One agreement with a provider is crucial from the customer perspective. Access to a single invoice no matter where the access or service is established is a must for innovative telecoms.

- Easy and precise modeling of even the most complex offers and partnership agreements
- Multi-currency, multi-taxation, multi-language support for global expansion
- One platform for all players in the ecosystem
- Product catalog ready for any roles and multiple partnerships
- Seamless ecosystem integration thanks to standard compliance (for example, TMF Frameworks and Open APIs)



OMNICHANNEL DIGITAL CUSTOMER ENGAGEMENT

A proactive approach is a must in the market of digital services. Ensuring readable and easily digestible visual cues are the most efficient way to improve the quality of telecom customers' digital experience. Simplifying reporting, recommendations and personalization engines, along with a 360-degree view of operations, are key to a successful and profitable customer journey. Telecoms can achieve these with Comarch BSS portfolio.

Omnichannel digital customer engagement is an answer to how to most effectively build a community. It is essential to understand customers' needs and adjust offers to suit them. Instant online availability of personal, financial and usage data through all channels will create more engaging experiences.

- Manage catalog services in a few simple steps
- Improve responsiveness and add a proactive approach with accurate data supplied in time
- Increase customer engagement by enabling self-service and digital sales
- Reduce customer support costs and improve SLA metrics by self-services
- Boost sales volume through mobile and website digital channels
- Increase sales and customer support efficiency with built-in processes
- Introduce a help engine including chat, chatbots, call center, and spectator mode
- Create highly customized guided customer journeys through omnichannel process management



END TO END ORCHESTRATION AND NETWORK PROCESSES

Comarch BSS/OSS systems ensure end-to-end orchestration of network planning, optimization and operations. It is important for all telecoms that wish to operate modern and multi-technology networks. Furthermore, it is to provide a high level of network function virtualization and programmability, especially when operators want to monetize 5G-based services such as network slicing, private network and more.

The unified chain of BSS and OSS systems enables an orchestration process which is streamlined and handled end-to-end, from the moment the commercial product is sold to a customer to the configuration of network devices. Comarch delivers a single and integrated system with product and service catalog as the driver for fully automated fulfillment.

- Automate product and service fulfillment
- Decrease time for service restoration
- Optimize workforce productivity
- Reduce the human error factor
- Achieve zero service downtime
- Increase customer satisfaction
- Enable new savings on CAPEX and OPEX



AUTONOMOUS NETWORKS FOR UNLIMITED 5G USE CASES

Comarch's product leads to increased network stability and performance, reduced levels of human interventions, simplified service designing, and improved service parameters. All that is possible with a fully intelligent network autonomous system that enables closed-loop network automation, self-healing and self-scaling, all automated and conducted in real time.

The implementation of full automation is the only way for telco operators to meet the requirements set by new technologies that are constantly appearing on the market. Comarch offers to design effective methods of interaction between infrastructure and service elements, create universal knowledge base for autonomous systems, and implement new maintenance processes.

- Intent-based service design with automatic, optimal realization
- Instant adaption of service topology to meet changing traffic levels
- An always-on network thanks to proactive optimization of resource usage
- OPEX reduction
- Simplification of network deployment and maintenance
- Zero-touch network management to support Industry 4.0



DIGITAL ENTERPRISE CUSTOMER EXPERIENCE

Enterprise customers can seamlessly self-manage even the most complex hierarchies in their organization structure, access detailed reporting in context, and set up real-time control or split-bill policies over service usage. Complete transparency and the ability to customize offers to meet customers' needs are decisive aspects when telecoms want to start cooperation with large enterprise.

The ideal BSS system should be flexible and easy to implement and manage. Comarch delivers a platform to deploy and manage communication facilitate collaboration across all aspects of telecommunications services, for example VPN, data center, cloud, mobile and fixed voice.

- Multi-level self-management for enterprise customers
- Support for complex hierarchies and multiple roles, enabling split-billing and real-time cost control of subscriptions
- Advanced reporting for complete transparency
- Digital-ready tools for managing subscription base, orders, cases, and financial information
- Simplified multi-tenant quotes and orders
- Support for frame agreements, enabling the creation of personalized offers



With a modern and innovative OSS portfolio, Comarch has repeatedly demonstrated strong and reliable business partnering with Vodafone. Comarch has provided high quality COTS products, coupled with their impeccable services, to implement solutions on time and within budget, adapting swiftly to new business requirements arising during and after implementation. Considering dimensions such as time to market, quality to market, customer obsession, agility, value and innovation, Comarch is a partner that invariably ticks all of the boxes.



Shane Gaffney

Director of OSS, Central Europe at Vodafone



COMARCH TELECOM CUSTOMERS

TELECOMS OPERATING WITHIN INTERNATIONAL GROUPS

CUSTOMER		IMPLEMENTATION SCOPE
$\mathbf{T}\cdots$	Telekom Deutschland telekom.de	End-to-end view of services with integrated resource and service layers thanks to Comarch Resource & Service Inventory.
T · ·	T-Mobile (formerly GTS) t-mobile.pl	Convergent billing for improved billing processes and shorter time to market for new services.
T · ·	T-Mobile Poland t-mobile.pl	Full automation of fault management tasks, including correlation and handling trouble tickets.
Telefónica	E-Plus, now owned by Telefónica Germany telefonica.de/e-plus-gruppe	Transformation of network planning and design processes with Comarch OSS.
Telefónica	Telefónica Global telefonica.com	Improved efficiency of network planning and optimization processes in Telefónica subsidiaries in Latin America.
Telefónica	Telefónica O2 Deutschland telefonica.de	Better control of network operations with transport network management & configuration, fault and performance mediation.
Vodafone	Vodafone Group vodafone.com	Fault management, service monitoring and performance management multi-tenant solution and tools for a single Vodafone Global NOC, managing the operator's networks in several countries.
Vodafone	Vodafone Germany vodafone.de	Integrated Assurance & Analytics for mobile, fixed and cable networks & services in Vodafone Germany, including Vodafone Kabel Deutschland.
O vodafone	VF Kabel Deutschland kabel.vodafone.de	Switching to process-driven infrastructure and network management, with centralized inventory management and planning.



Orange Luxembourg

orange.lu

Comprehensive BSS stack for mobile, fixed and network services.



Orange Poland

orange.pl

Optimization of field service management for a network covering more than 300 000 square kilometers and more than 20 million subscribers.



Orange Ivory Coast

orange.ci

IT transformation agreement to deliver better digital experience to the growing base of mobile and fixed services end-customers.



A1 Telekom Austria Group

a1.group

Support in entering the IoT / M2M market and becoming the leading M2M boutique provider in the CEE region thanks to Comarch IoT Connect.



STC

stc.com.sa

Using Comarch IoT Connect to create a new IoT connectivity platform serving the Saudi market.



Bitė Group

bite.lt bite.lv Rollout of OSS/BSS IT infrastructure covering major operational and business processes.



e& United Arab Emirates

e&UAE.ae

Revolutionizing connectivity in the United Arab Emirates with Comarch Field Service Management.

FIXED AND MOBILE, TRIPLE AND QUADPLAYERS

CUSTOMER		IMPLEMENTATION SCOPE
arqıva	Arqiva THE UNITED KINGDOM	Support for development of next-generation smart metering services thanks to Comarch OSS & assurance products combined with Managed Services.
dtms	dtms GERMANY	New sophisticated billing system extending the supply chain with separate pricing of services for individual customers.
@kpn	KPN THE NETHERLANDS	Integrated BSS system for large enterprises and corporates, leading to streamlined KPN customer experience, reduced costs and minimal investment risks.
Жиївст ар	Kyivstar UKRAINE	A reliable and deeply automated FSM system tailored to the needs of Ukraine's largest telco operator.
① LG U+	LG U+ SOUTH KOREA	Support in launch of the world's first 5G network with the help of Comarch products from the Operations Support Systems and Intelligent Assurance & Analytics range.
MØBILE VIKINGS	Mobile Vikings BELGIUM	Transformation into a full MVNO and BSS overhaul for three operator brands.
plus #	Polkomtel POLAND	Support for the wholesale B2B activities with InterPartner Billing system for one of the biggest mobile telecom carriers in Poland.
Síminn	Siminn ICELAND	Enhancement of multi-service, multi-technology and multi- vendor IT environment and operations with Comarch BSS.
Sunrise	SUNRISE SWITZERLAND	Supporting Sunrise's IoT services expansion by delivering an out-of-the-box IoT Connect Platform.



du THE UNITED ARAB EMI-RATES A complete OSS overhaul for improved network inventory and topology management, aiming to improve operational efficiency and cost efficiency.



VALO Networks
CANADA

Support for an innovative broadband Internet access project with the help of Comarch BSS.



Netia POLAND

Delivery of system handling interconnect agreements, covering current and future needs.

Implementation of Comarch Fault Management for reduced risk of network failures and improved service quality



open eir IRELAND

Improved field service efficiency and customer experience through advanced Comarch FSM system.

CABLE/SATELLITE TV

CUSTOMER		IMPLEMENTATION SCOPE
Media Broadcast	Media Broadcast GERMANY	Support for Germany's largest broadcast and media industry service provider in the rapid and efficient introduction of new TV services (under the brand name freenet TV), based on DVB-T2.
*/ vectrx	Vectra POLAND	Comprehensive BSS system supporting the Polish multi-play operator in pursuit of a product innovation strategy, through streamlining and facilitating the creation of new offers. Project carried out for Multimedia:
		Deployment of a comprehensive billing system replacing the various legacy systems of Multimedia's daughter companies.
> ✓ xtrim°	xtrim (Previously Grupo TVCable) ECUADOR	Increasing operational efficiency via a centralized BSS system for multiple billing and customer care systems.
		Implementing a Field Service Management system to automate tasks in the field.
Viasat: 1	ViaSat USA	Customer experience improvement in a multi-partner model of field service delivery.
tigô	Tigo (Previously CableOnda) PANAMA	Helping a local cable operator to become customer-centric and maximize profits with a new end-to-end BSS solution.

OTHER

CUSTOMER		IMPLEMENTATION SCOPE
//>450 connect	450connect GERMANY	Providing a customized BSS/OSS system to the company, with exclusive assignment of the 450MHz spectrum in Germany.
## FUTURE CONNECTIONS	FUTURE CONNECTIONS THE NETHERLANDS	FSM integration, operation automation, and improved customer experience for B2B and B2C clients in the Netherlands.
SCSK	SCSK JAPAN	Supporting the creation of an IoT ecosystem for Japanese enterprises for a software provider.
ITOCHU Techno-Solutions Corporation Challenging Tomorrow's Changes	ITOCHU Techno-Solutions JAPAN	Streamlining the operations supporting readiness, fulfillment, assurance and service monitoring domains, for the digital transformation in Japanese telecoms.
mtm	MTM - PT MEDIA TELEKOMUNIKASI MANDIRI INDONESIA	Streamlined field service operations and automated management of more than 300,000 communications circuits and thousands of network devices in Indonesia.



We chose Comarch because their existing product portfolio provided a good basis for the platform. More importantly, Comarch was able to prove their ability to quickly develop custom features upon request. We believe that, in dynamically growing markets, flexibility and customer orientation are the keys to success. The set-up we have chosen with Comarch helps us deliver just that.



A1 Telekom Austria Group

High Management Representative



ABOUT COMARCH

Since 1993, Comarch's specialist telecommunications business unit has worked with some of the biggest telecoms companies in the world to transform their business operations. Our industry-recognized telco OSS and BSS products help telecoms companies streamline their business processes and simplify their systems to increase business efficiency and revenue, as well as to improve the customer experience and help telcos bring innovative services to market. Comarch's customers in telecommunications include Telefónica, Deutsche Telekom, Vodafone, KPN and Orange.

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