



CASE STUDY

Securing Private 5G for **Industry 4.0** **Operations**

Helping an Industrial Enterprise Build a Secure and Resilient
Private 5G Network

Executive Overview

A leading industrial organization was deploying a Private 5G network to support its Industry 4.0 initiatives, including connected devices, automation systems, smart manufacturing, and operational technologies.

While Private 5G offered significant operational advantages, it also introduced new security risks across the network, core infrastructure, radio access systems, and connected assets.

Matrix Shell Technologies conducted a comprehensive Private 5G Security Audit and Assessment to identify security gaps, validate existing controls, and strengthen the organization's overall security posture.



Challenge

The organization was investing in a Private 5G network to connect critical business and operational systems.

As more machines, sensors, applications, and production systems became interconnected, the attack surface expanded significantly.

The organization needed answers to important questions:

- Are security controls configured correctly?
- Is network segmentation working as intended?
- Are critical 5G components adequately protected?
- Could an attacker exploit weaknesses in the environment?
- Is the deployment aligned with industry security standards?

Without clear visibility into these areas, security gaps could lead to operational disruption, data exposure, compliance concerns, and production downtime.



Objectives

The organization wanted to:

- Identify security weaknesses across the Private 5G environment
- Validate security controls and access management
- Assess the security of 5G Core and Radio Access Network components
- Verify compliance with industry best practices
- Reduce cyber risk and operational exposure
- Strengthen long-term security governance

Solution

Matrix Shell Technologies delivered a structured two-phase security engagement designed specifically for Private 5G environments.

Phase 1: Security Audit

A detailed review was conducted covering:

- Network architecture and design
- Security controls and segmentation
- Configuration reviews
- Access management policies
- Compliance alignment

This provided a clear understanding of the existing security posture and highlighted potential weaknesses before they could be exploited.

Phase 2: Security Assessment

The assessment expanded into active security testing of critical 5G components, including:

- 5G Core Network Functions
- Service-Based Interfaces (SBI)
- APIs and authentication mechanisms
- Radio Access Network (RAN)
- Roaming security controls where applicable

The goal was to validate security from an attacker's perspective while identifying practical improvements.

Testing Process

Step 1

Discovery & Scope Definition

The team worked with stakeholders to understand:

- Network architecture
- Deployment model
- Critical assets
- Security priorities

Step 2

Architecture & Configuration Review

Security experts reviewed:

- Design documentation
- Network segmentation
- Security configurations
- Existing controls and policies

Step 3

Active Security Testing

Targeted assessments were performed on:

- 5G Core components
- APIs and interfaces
- Authentication mechanisms
- Radio access infrastructure

Step 4

Risk Analysis

All observations were analyzed and prioritized based on business impact and likelihood of exploitation.

Step 5

Reporting & Debrief

Matrix Shell delivered:

- Executive-level findings
- Technical assessment details
- Prioritized recommendations
- Remediation guidance

Results & Impact

Following the engagement, the organization achieved measurable improvements in security visibility and risk management.



Key Outcomes

- Comprehensive visibility into Private 5G security posture
- Identification of critical and medium-risk security gaps
- Improved network segmentation and access control validation
- Stronger protection of 5G Core and RAN components
- Reduced attack surface across connected environments
- Improved compliance readiness against industry standards
- Increased confidence in Private 5G deployment and operations



Business Impact

- Reduced risk of operational disruption
- Improved security governance
- Faster remediation of identified weaknesses
- Better protection for connected industrial systems
- Enhanced readiness for future expansion and innovation

Conclusion

Private 5G is becoming a critical foundation for Industry 4.0 and Industry 5.0 initiatives. However, as connectivity grows, so does the need for robust security.

Through a comprehensive Private 5G Security Audit and Assessment, Matrix Shell Technologies helped the organization identify risks, strengthen defenses, and build a more secure and resilient network environment.

The result was a stronger security posture, improved operational confidence, and a secure foundation for future digital transformation initiatives.