Continental
The Future in Motion

The Connected and Electric Future: Enabling Secure V2X and EV Ecosystems

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Bangalore
Chapter

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Business Area Architecture and Networking Solutions
February 2025

Introduction

Sandeep K M
Head of Engineering Systems for Business Area - Architecture Networking and Solutions

- Driving Business objectives in System Engineering domain for various product lines including function safety, cyber security and legal technical regulation/standards
- Define the System Engineering strategy in alignment with both global and local objectives

Born: Bangalore India,
Married, 1 kid

Movies, Driving & Traveling, Gardening

Continuous Learning, Collaboration, Trust & Transparency

17.5 yrs in Automotive (6.5yrs in Continental)

Telematics and V2X

Advancement of the Connected Car

3G / HSDPA	4G / LTE	4.5G / LTE-A	5G	6G
				Development started...
Base Telematics – eCall/ERA/SVT	Vehicle-2-Network Communication	Cellular Vehicle-to-X (C-V2X)	C-V2X	Internet of Things
Diagnostics, Remote Vehicle Functions	Media Streaming	Multiple HD Video Streams	Vehicle Integrated with IoT	Integration with Non-Terrestrial
Server-based Navigation	Wi-Fi Hot Spot	Real Time HD Maps	Cooperative Maneuvers	Driving towards Vision Zero networks
SW OTA Update – TCU	Dynamic eHorizon	SW OTA Update – Full Vehicle	Teleoperated Driving	Mixed-traffic coordination (AD, manual)
Up to 14.4 Mbps	**Up to 150 Mbps**	**1000+ Mbps**	**10+ Gbps**	**…even faster**

5G Next Generation Connectivity

Key enabler for future mobility

5G Next Generation Connectivity…

Offers major network improvements and benefits

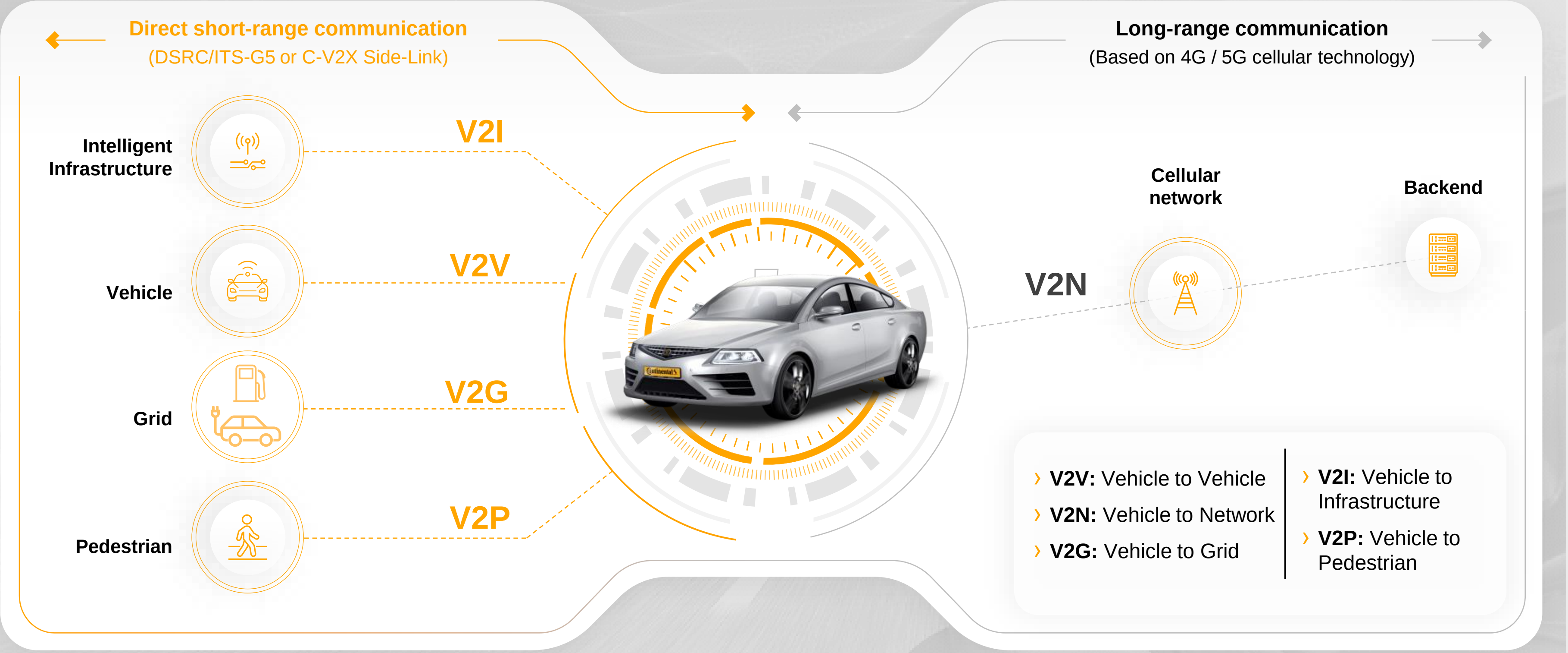
Will be a key, enabling technology for future mobility

Will allow for real-time communication between vehicles, the infrastructure and an ever-growing number of connected devices thanks to enhanced data rates, network slicing and
ultra-low response times

Will help to further increase driving safety, comfort and efficiency

V2X Communication Paths

A Comprehensive System of Connectivity



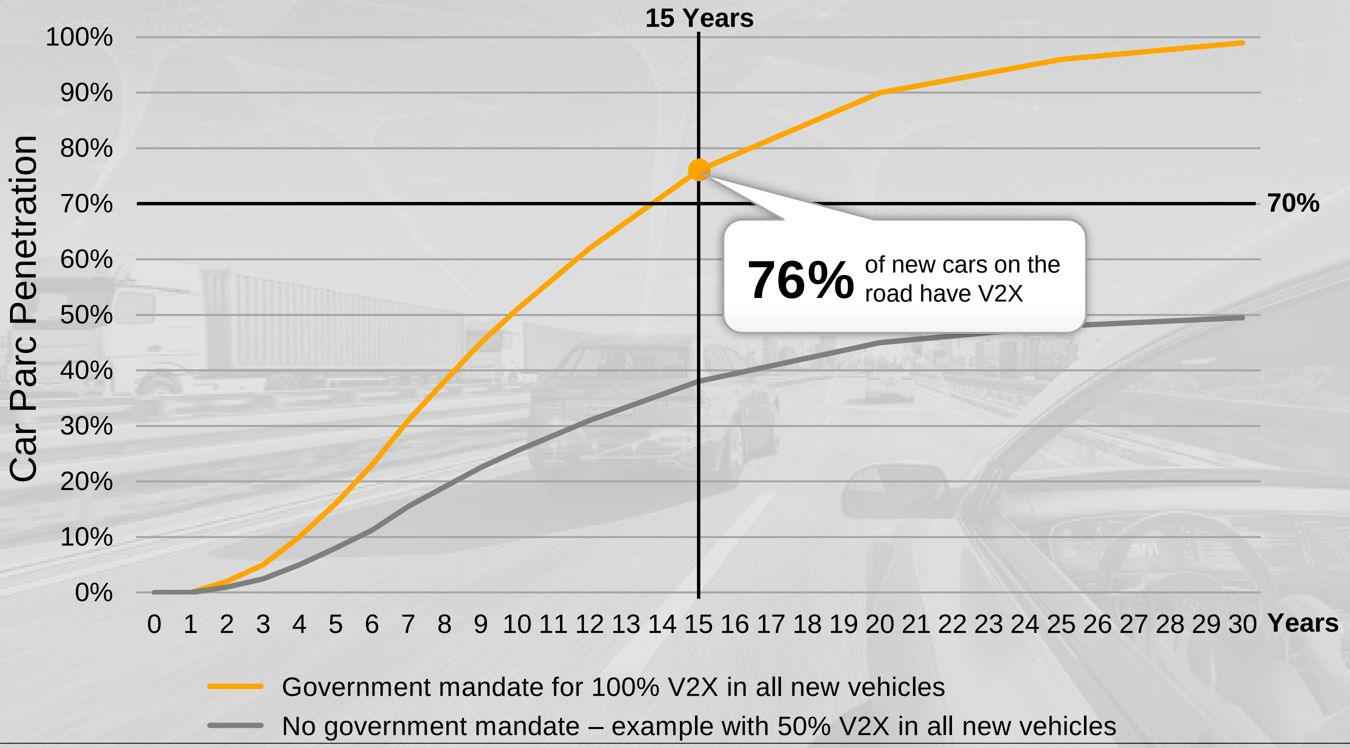
Direct short-range communication
(DSRC/ITS-G5 or C-V2X Side-Link)
Long-range communication
(Based on 4G / 5G cellular technology)
Intelligent Infrastructure
V2I
Vehicle
V2V
Grid
V2G
Pedestrian
V2P
V2N
Cellular network
Backend

- **V2V:** Vehicle to Vehicle
- **V2N:** Vehicle to Network
- **V2G:** Vehicle to Grid
- **V2I:** Vehicle to Infrastructure
- **V2P:** Vehicle to Pedestrian

Data Source: US Department of Transportation FMVSS 150
Car Parc: All registered vehicles

Problem

V2X Deployment Takes Time

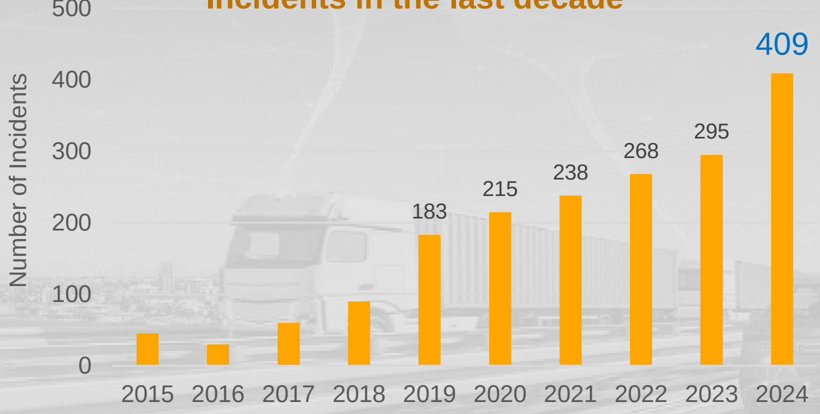


76% of new cars on the road have V2X

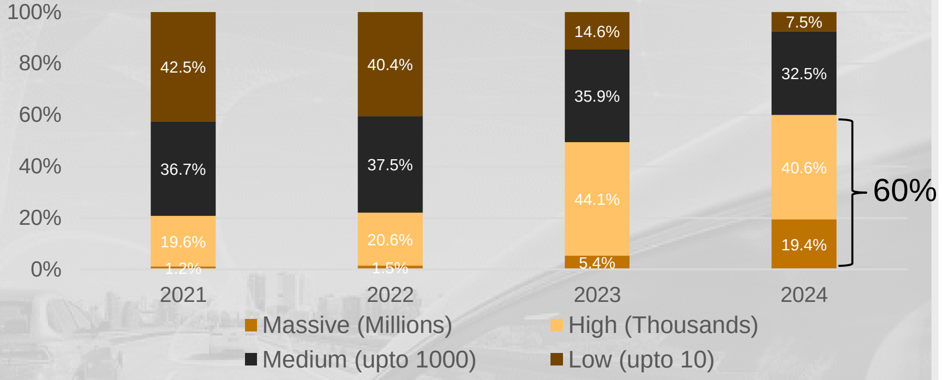
Security Incidents in Automotive & Smart Mobility

Trends and Insights

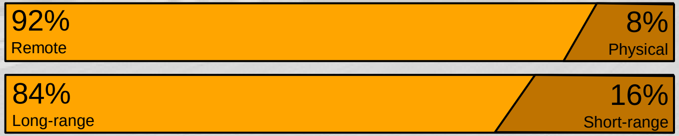
Automotive & Smart Mobility Security Incidents in the last decade



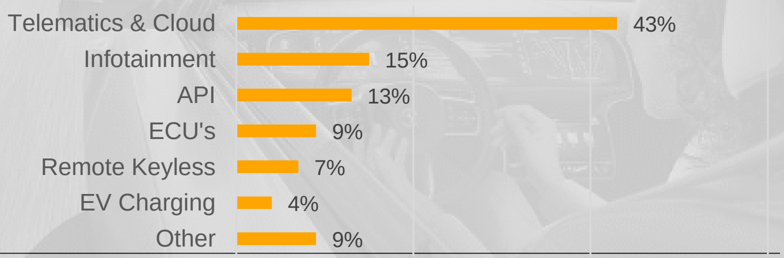
Impact of Security Incidents on Mobility Assets



Categorization of Security Incidents

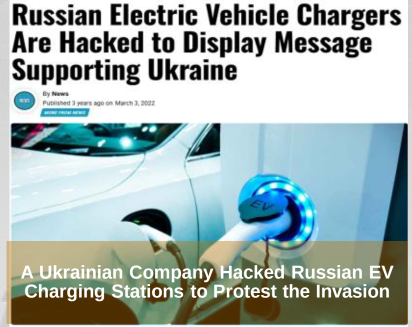


Attack Paths



Source: Upstream Security Ltd report Jan 2025

Security Incidents in Automotive & Smart Mobility



Russian Electric Vehicle Chargers Are Hacked to Display Message Supporting Ukraine

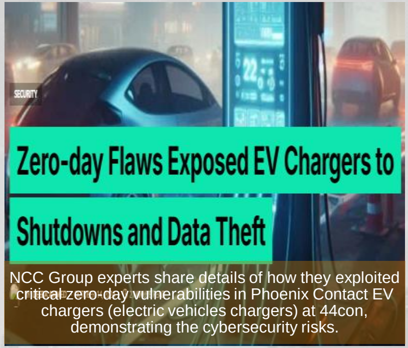
By News
Published 3 years ago on March 3, 2022

A Ukrainian Company Hacked Russian EV Charging Stations to Protest the Invasion

Ravie Lakshmanan

Automotive Inc

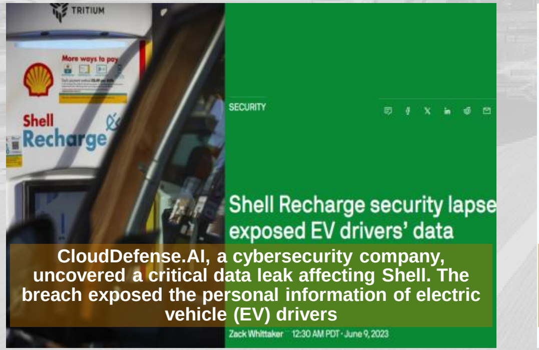
Hackers could unlock Kia car with just a license plate



SECURITY

Zero-day Flaws Exposed EV Chargers to Shutdowns and Data Theft

NCC Group experts share details of how they exploited critical zero-day vulnerabilities in Phoenix Contact EV chargers (electric vehicles chargers) at 44con, demonstrating the cybersecurity risks.

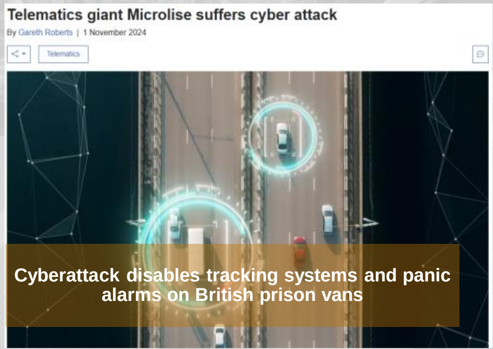


SECURITY

Shell Recharge security lapse exposed EV drivers' data

Zack Whittaker 12:30 AM PDT · June 9, 2023

CloudDefense.AI, a cybersecurity company, uncovered a critical data leak affecting Shell. The breach exposed the personal information of electric vehicle (EV) drivers



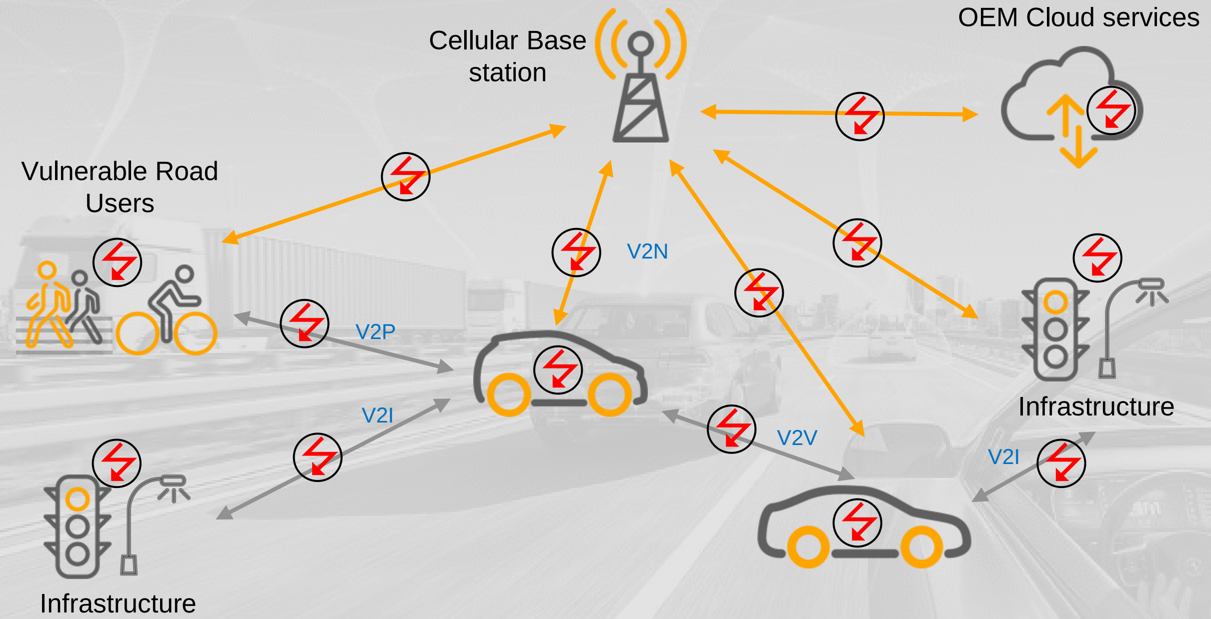
Telematics giant Microlise suffers cyber attack

By Gareth Roberts | 1 November 2024

Telematics

Cyberattack disables tracking systems and panic alarms on British prison vans

Possible attack vectors in the V2X Ecosystem

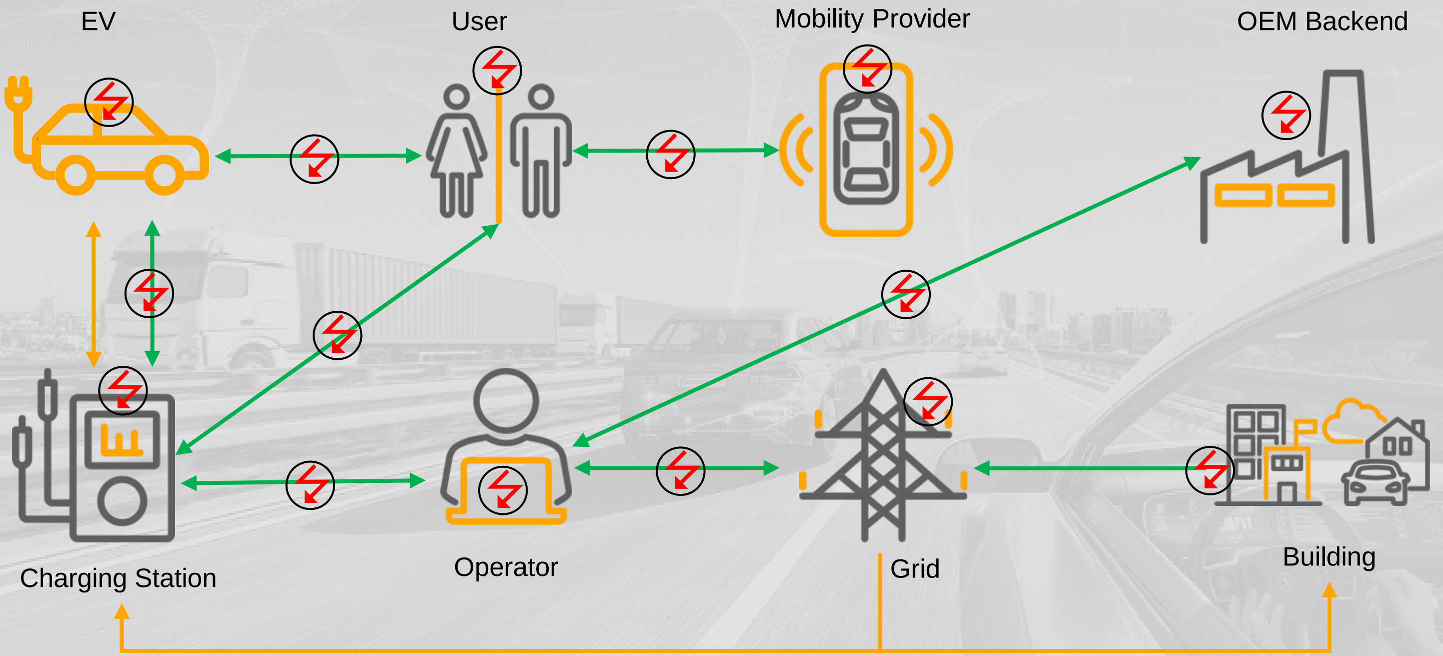


Possible attack vectors in the EV Ecosystem

↔ Electricity

↔ Data Exchange

ϟ Attack Vector



EV

User

Mobility Provider

OEM Backend

Charging Station

Operator

Grid

Building

Source: Securing the Electric Vehicle Charging Infrastructure from Research Gate, May 2021

Security Attack Impact in Automotive & Smart Mobility

Attack Type	Security			Impact			Remarks
	Confidentiality	Integrity	Availability	Social	Cyber	Physical	
Denial of Service (DoS)			●	●	●		Blocking of Communication
Replay attack / Man in the middle	●	●			●	●	Eavesdropping, Disclosure of Information
Spoofing / Phishing	●			●	●		Stealing of sensitive information
Sybil attack		●		●			Network Disruption, Fraudulent transactions
Impersonation / Cloning		●		●	●	●	Reputation damage, Financial losses, Loss of Trust
Injection		●			●	●	Safety Issues and Abnormal System behavior

Cybersecurity Drivers in Automotive & Smart Mobility

Standards

- ISO 15118, ISO 21434
- Open Charge Point Protocol
- EN 303 64
- DSRC, IEEE 802.11

Regulations

- UNR 155/156
- Cyber Resilience Act, NIS2, GDPR
- AIS 138/189/190
- NEVI (National Electric Vehicle Infrastructure)

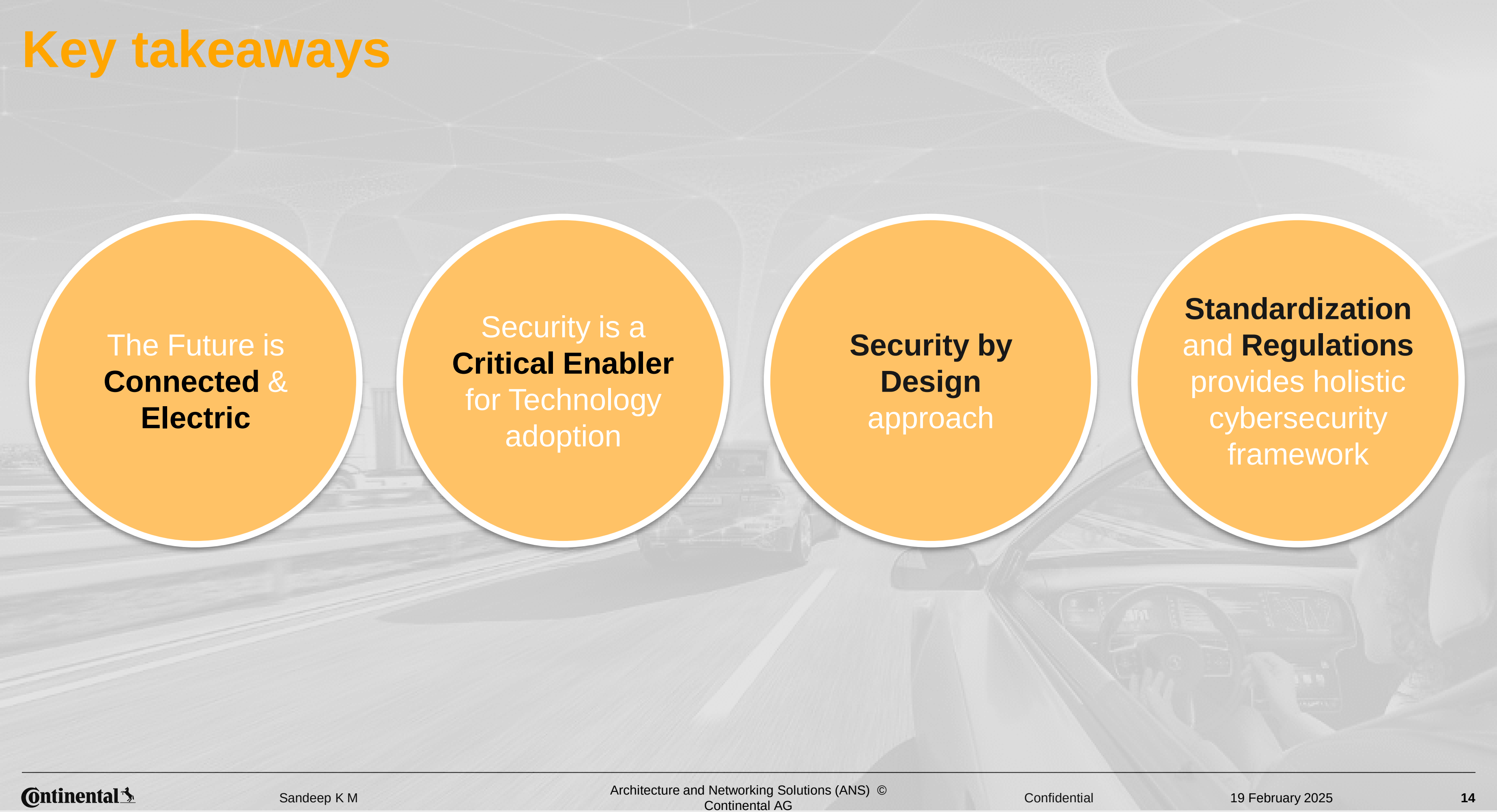
Industry

- 5G Automotive Association
- 3GPP
- Charging Infrastructure Initiative
- ElaadNL

Security Mechanisms for Automotive & Smart Mobility

- Strong Authentication and Access Control
- Encryption and Secure communication protocols
- Intrusion Detection And Monitoring
- Security By Design
- Network segmentation
- Regular software updates and patching
- Robust Cyber Security Management System

Key takeaways



The Future is **Connected** & **Electric**

Security is a **Critical Enabler** for Technology adoption

Security by Design approach

Standardization and **Regulations** provides holistic cybersecurity framework

Thank you

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