5G Private Networks In Actions

Use cases and challenges for future mission critical applications in agro

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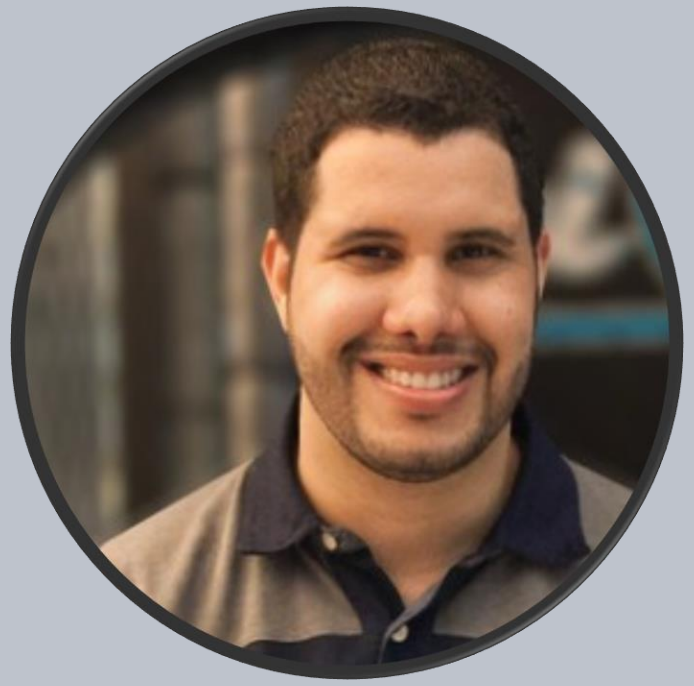

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Specializations:
Communications, Universidade Federal Fluminense.
Mobile Communications, Universidade Federal Fluminense.
Smart Manufacturing: Production in Industry 4.0, Massachusetts Institute of Technology
Digital Television, Broadcast and New Media, Universidade Federal Fluminense.

Agenda

GRUPO JACTO

- Grupo Jacto - Our History
- Mission Critical 5G Private Network
  Jacto Unity Paulópolis
- Mission Critical 5G Private Network
  Reference Architecture Industry & Agro
- Mission Critical 5G Private Network
  Use Case - RF & Access Network Redundancy
- Mission Critical 5G Network
  Use Case - AGVs, Data Colletor and 5G CPE
- Mission Critical 5G Private Network
  Key Challenges For The Future

Grupo Jacto
Our History

No one grows alone

Our History

GRUPO JACTO

The Jacto Group was founded by Shunji Nishimura, a Japanese immigrant who arrived in Brazil in 1932 with just 20 years of age, a bible, a diploma in mechanics, and 100 dollars. After working in various fields, Nishimura settled in Pompeia, a city in the countryside of São Paulo, where he opened a small workshop.

A visionary and entrepreneur, Nishimura began improving models of powder dusters, investing in technology and research to meet the needs of farmers. His business grew and transformed into a business group with a global presence.

Nishimura built his family in Pompeia, a city he adopted as his home. His life trajectory and professional success are intertwined with the history of the Jacto Group, an example of how an immigrant can prosper and contribute to the development of a country.

Grupo Jacto

About US

GRUPO JACTO

With a history of over 76 years and a presence on all five continents, the Jacto Group is comprised of 6 companies operating in the agricultural, foundry, polymer application technologies, transport and logistics, handling and storage, cleaning equipment, and medical-hospital sectors.

But above all, the Jacto Group is made of people. Thousands of employees, customers, and partners make it possible for us to speak of innovation, trust, and values. There are countless families dedicating part of their lives to building our history as well.

+110 Countries

JACTO

SÍNTEGRA

UNIPAC

RODOJACTO

Mission Critical 5G Private Network
Jacto Unity Paulópolis

Mission Critical 5G Private Network

Jacto Unity Paulópolis First 5G Private Network Agricultural Machinery Industry In Latin America

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5G Private Network Reference Architecture

Mission Critical 5G Private Network

Mission Critical 5G Privative Network the keys for the design

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What are the keys for designing a mission critical network for us?

Connectivity
Management
Availability
Performance
Disaster Recovery
Integration
Scalability
Security
Complexity
Zero Down Time
Cost
Optimizing Performance
Mobility
Compatibility
Compliance

5G

Mission Critical 5G Private Network

Reference Architecture 5G Private Network for the Industry

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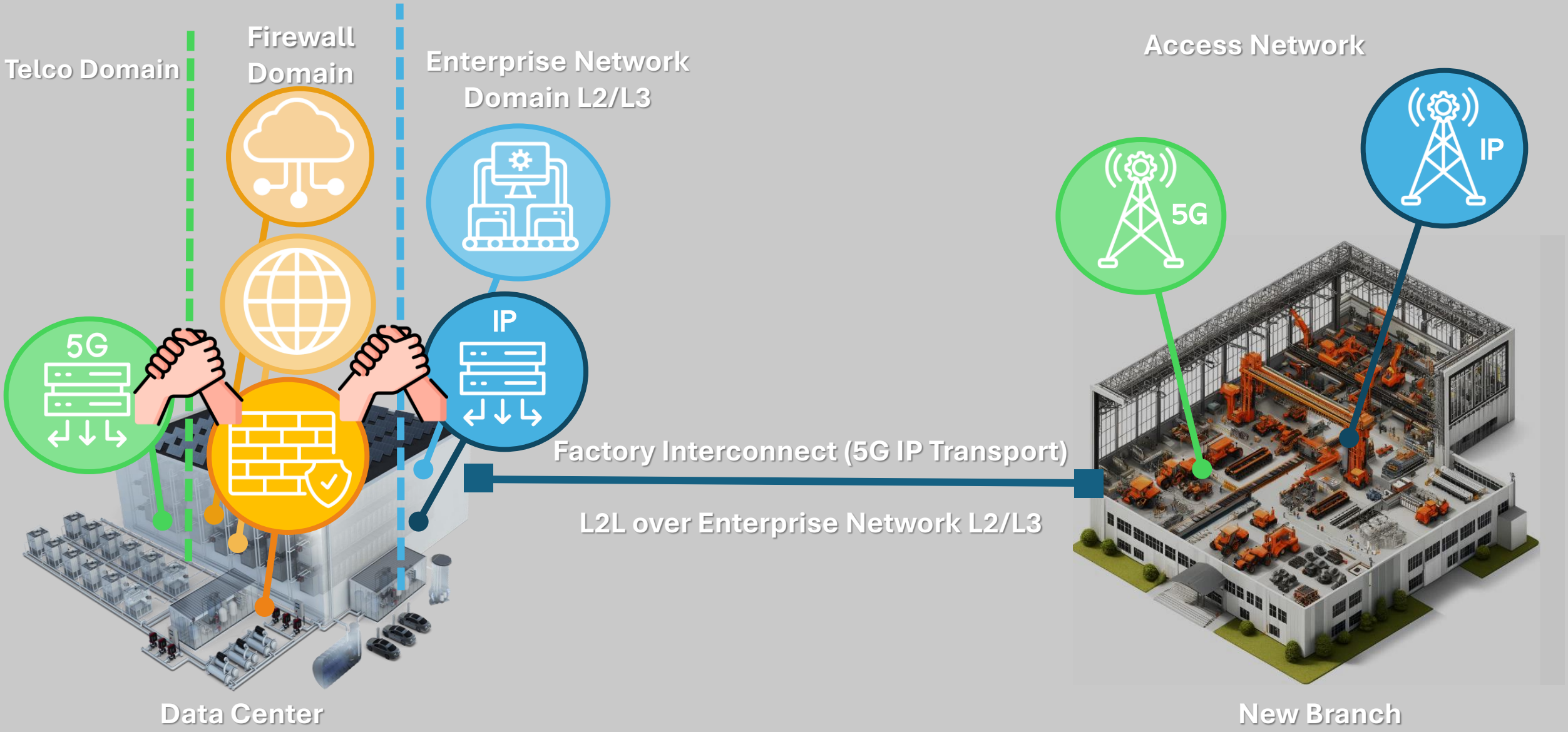

Mission Critical 5G Private Network

Reference Architecture Critical Mission LTE Private Network Agro

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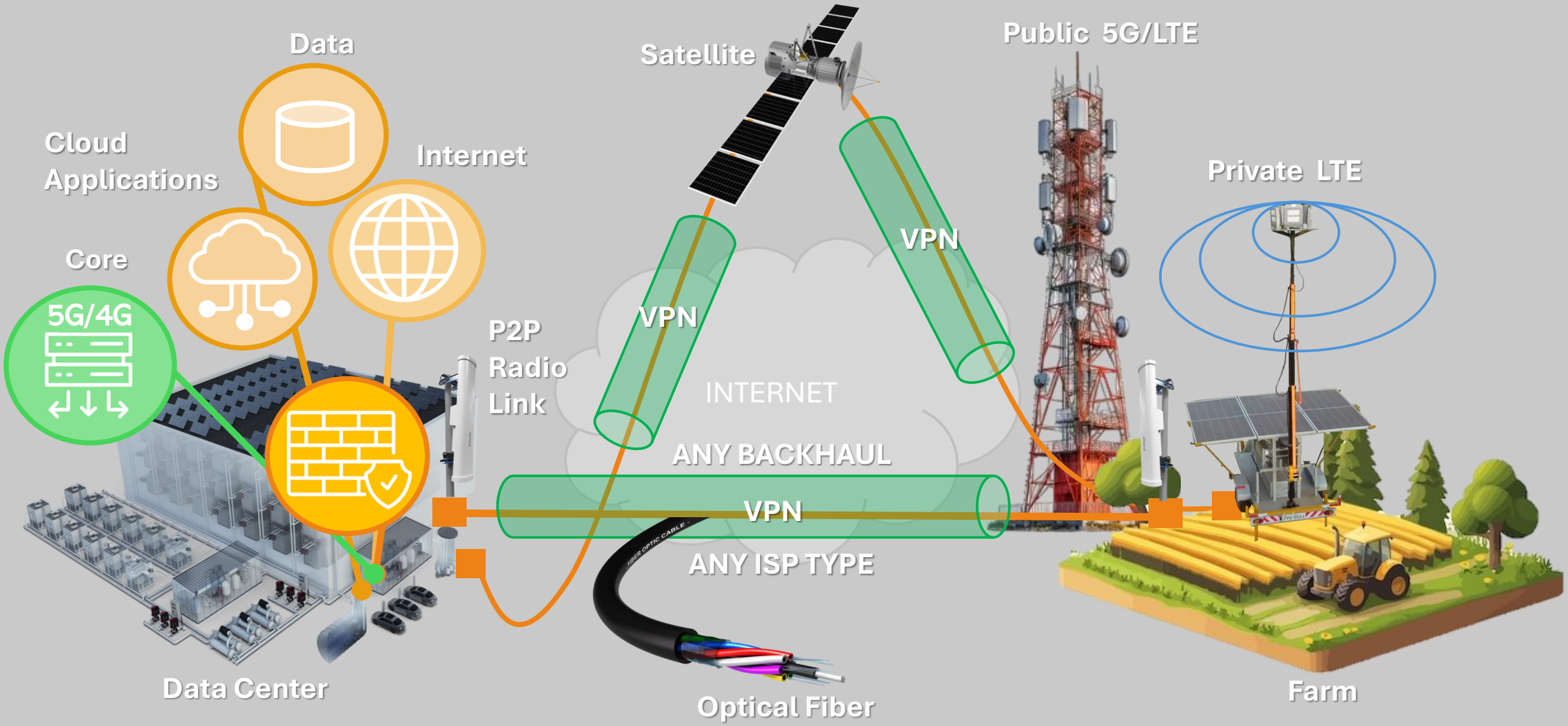

5G Private Network

Mission Critical 5G Private Network Design

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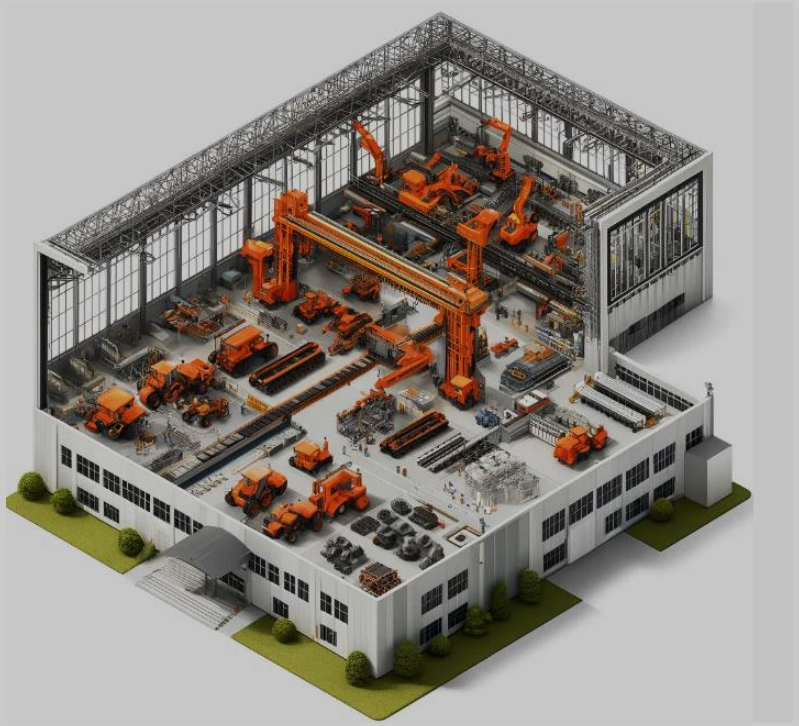
- 5G
  - High Availibilty
  - Mutiple APNs (Segmentation Traffic Scenarios)
  - Remote Access for Maintenance Network (Consoles, OOB and Management)
  - Management Network Systems / Monitoring Devices
  - Jump Server
- High Availibilty
  - SD-WAN
  - Virtual Domain
- IP 5G
  - Device for Evaluating Application Performance on 5G and Wi-Fi
  - Spare Parts for Non-Redundant Equipment
  - Redundancy Physical Path Until 5G/4G/WI-FI Radio
- IP DATA CENTER
  - Power Redundancy
  - Geo Links Redundancy
  - High Availibilty

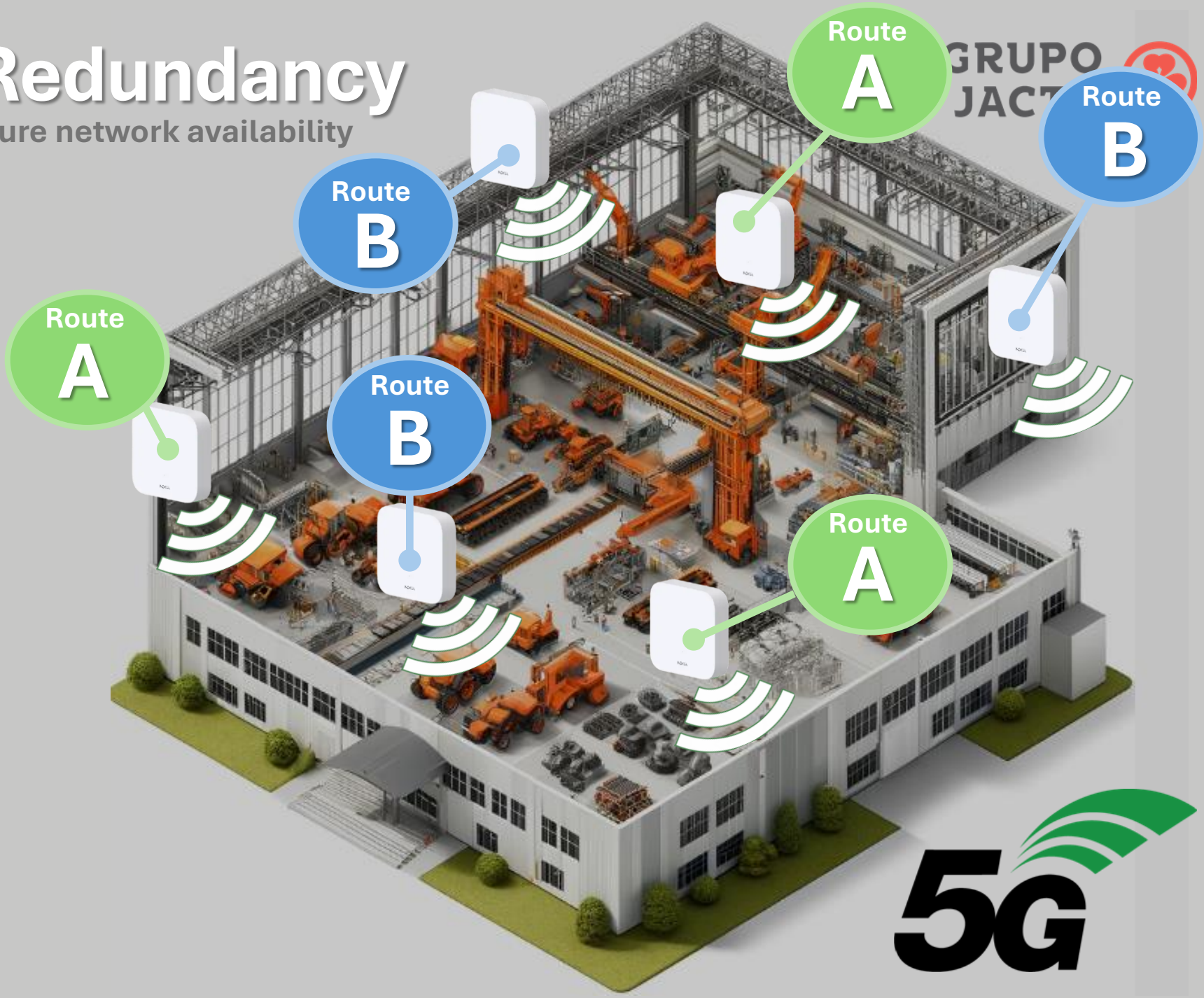


Mission Critical 5G Private Network

Use Case - RF & Access Network Redundancy

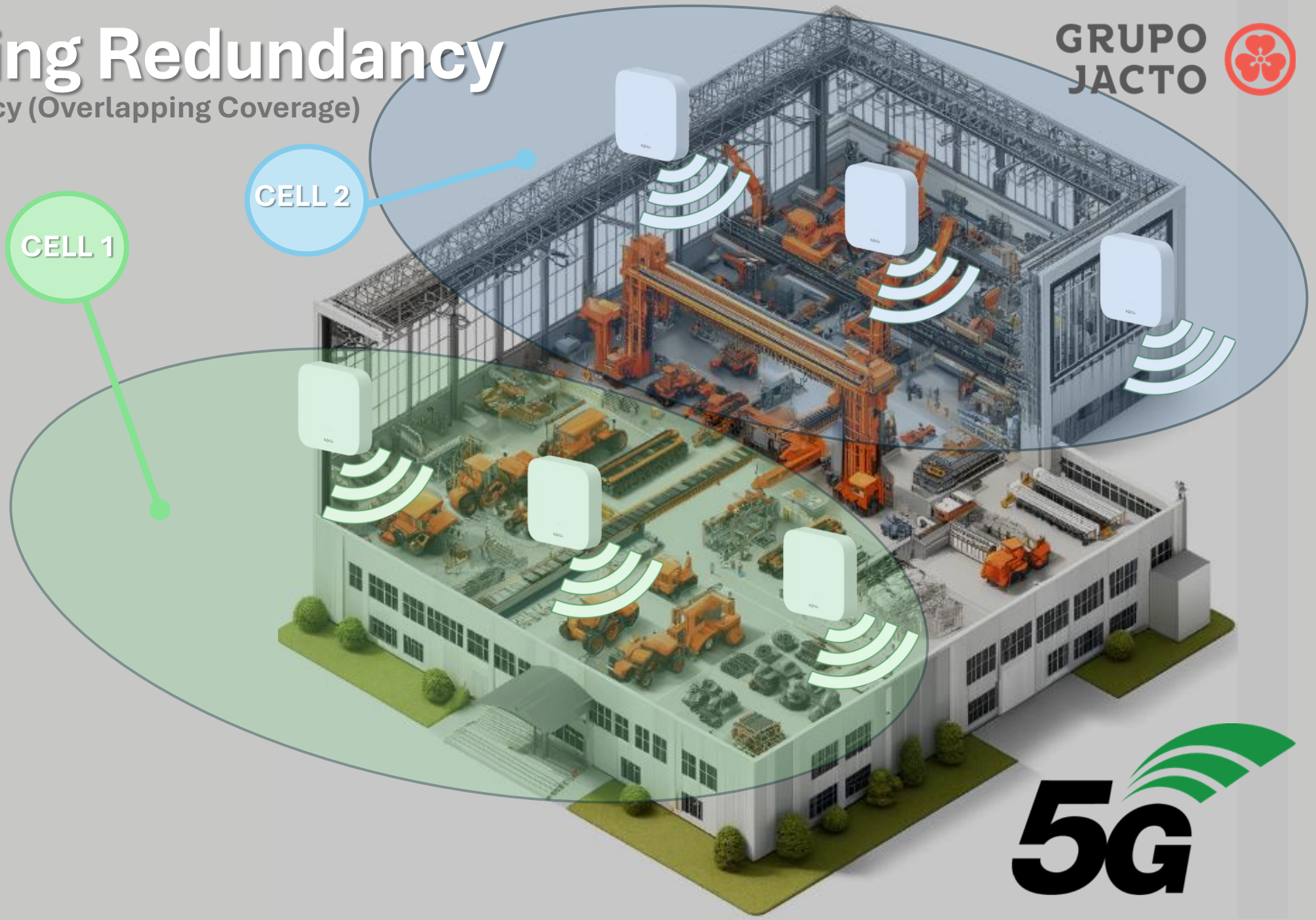
Radio Access Redundancy

Diverse physical cable routes ensure network availability



RF Covering Redundancy

RF Design Redundancy (Overlapping Coverage)



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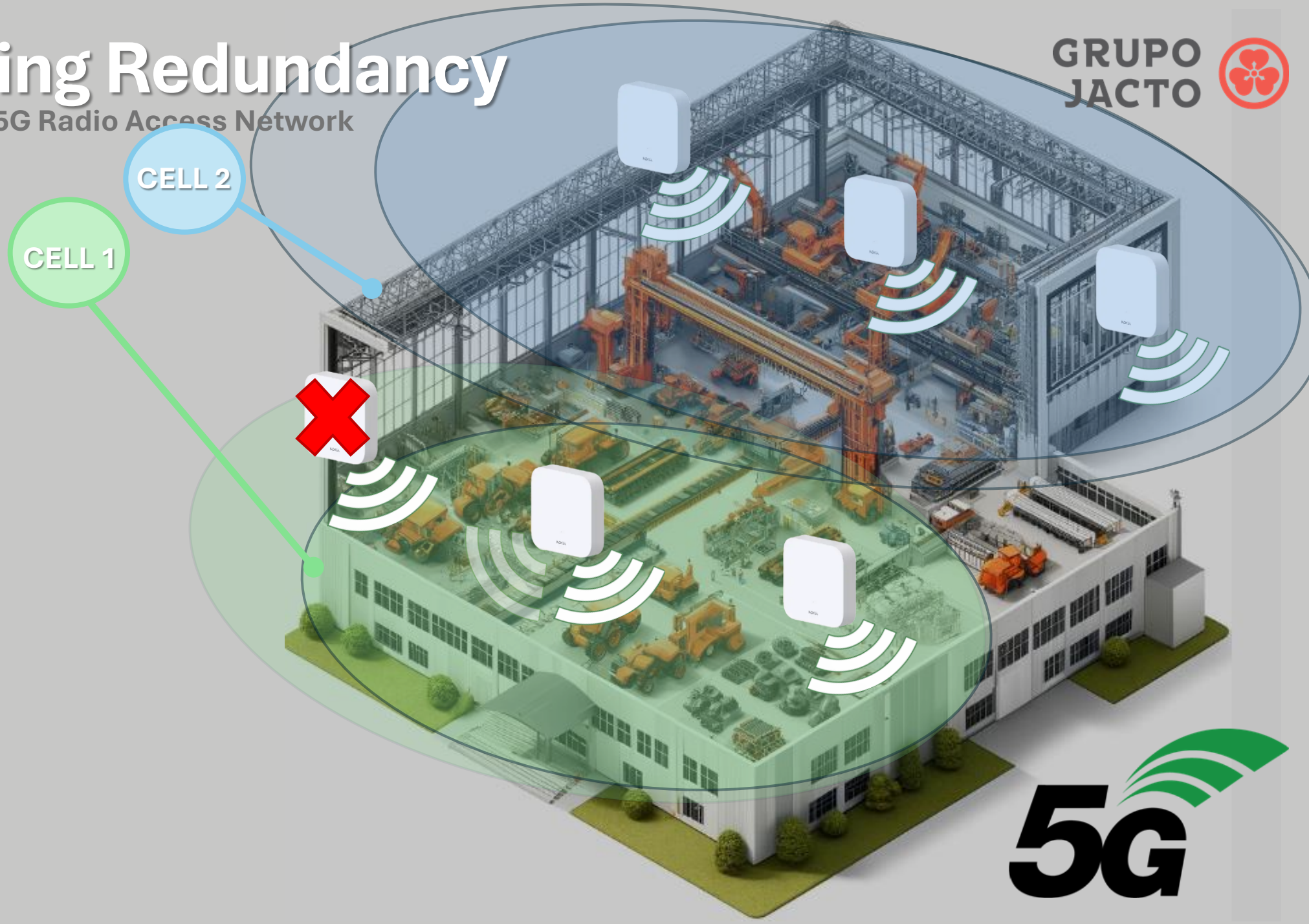
5G

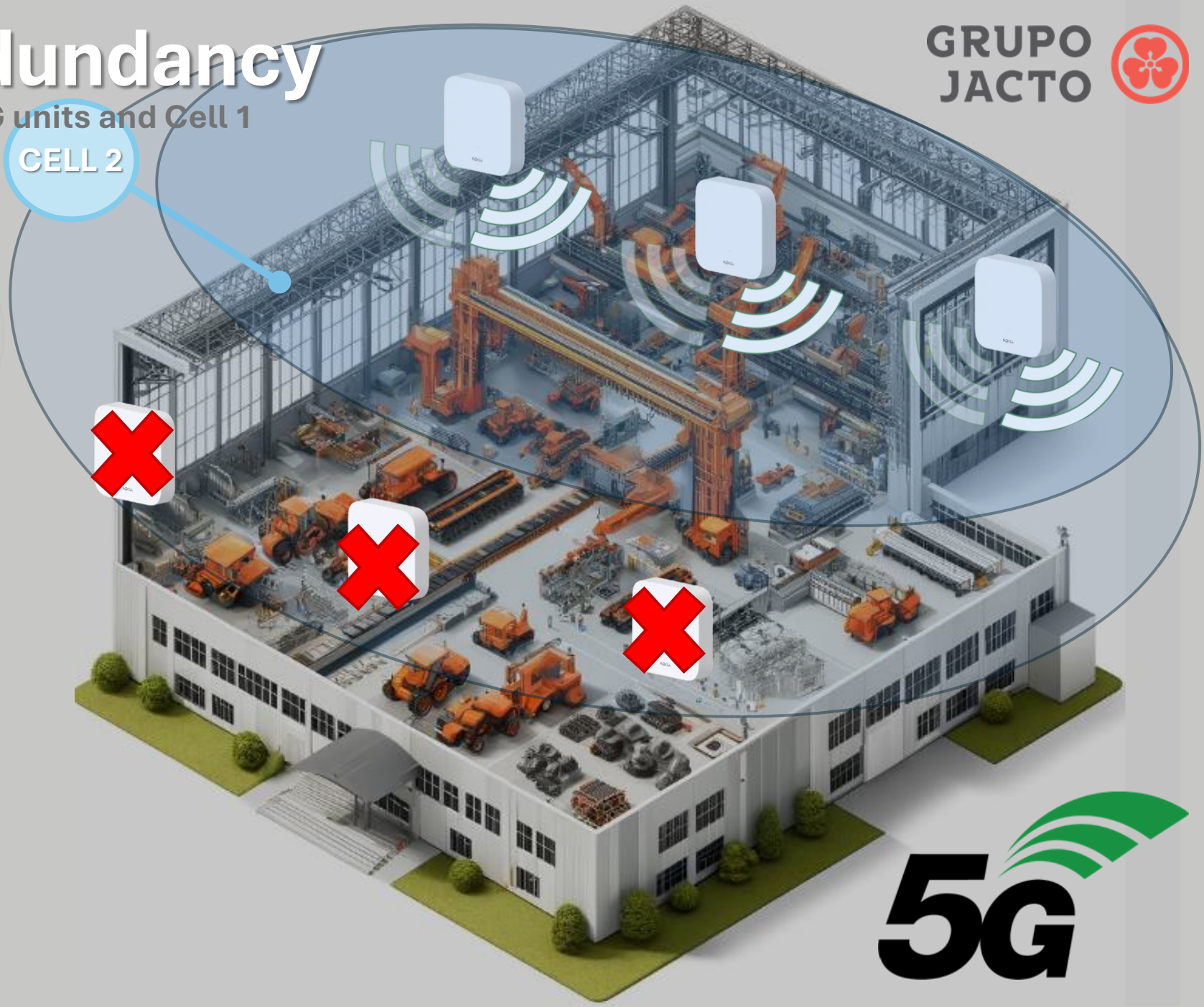
RF Covering Redundancy

Failure one picocell 5G Radio Access Network



RF Covering Redundancy

In case of failure of three picocell 5G units and Cell 1



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5G

RF Covering Redundancy

In case of 5G network outage, utilize WI-FI Backup

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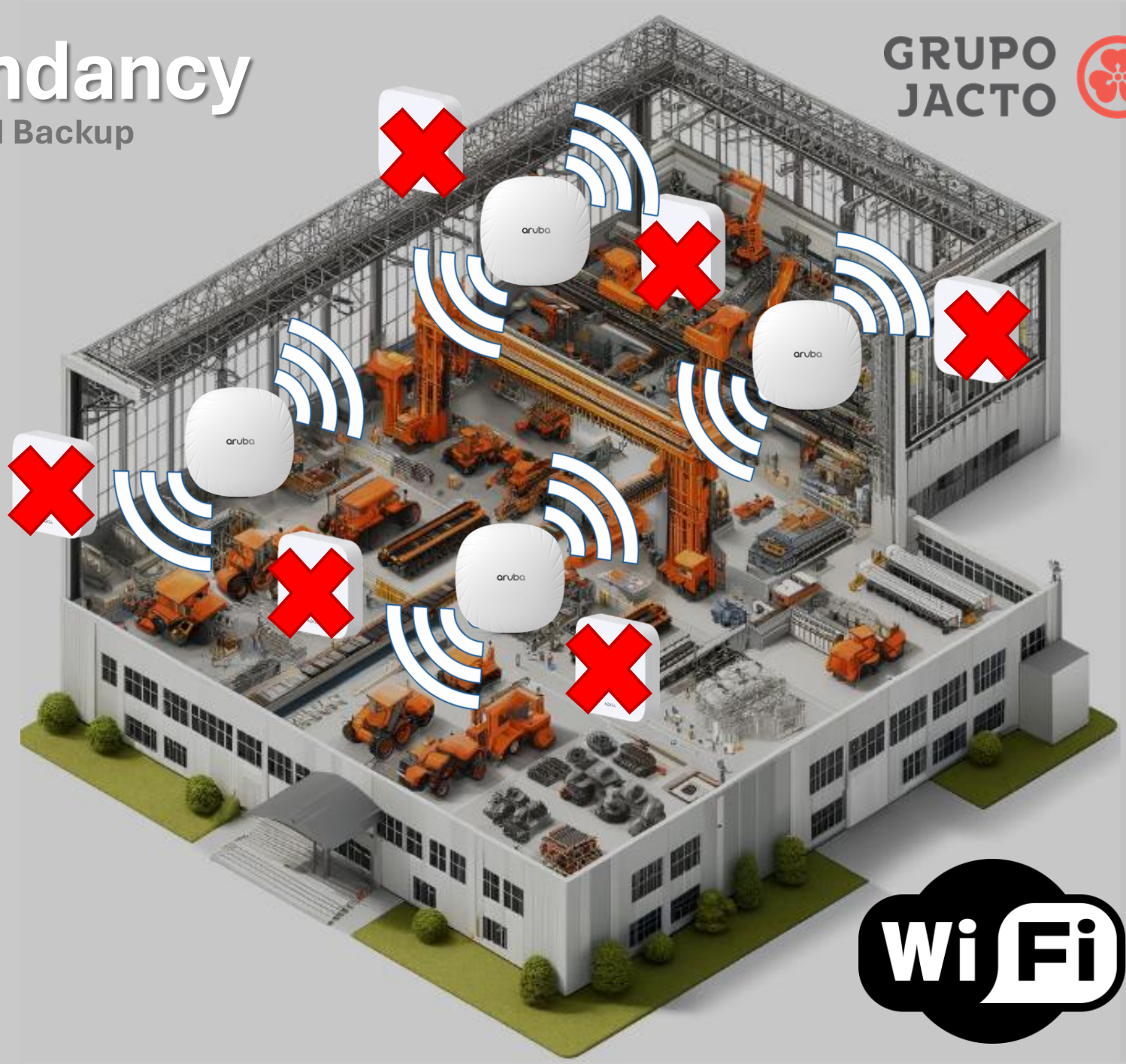

Wi Fi™

RAN Resilience and Reliability

RAN Resilience and Reliability Design for Mission Critical Applications

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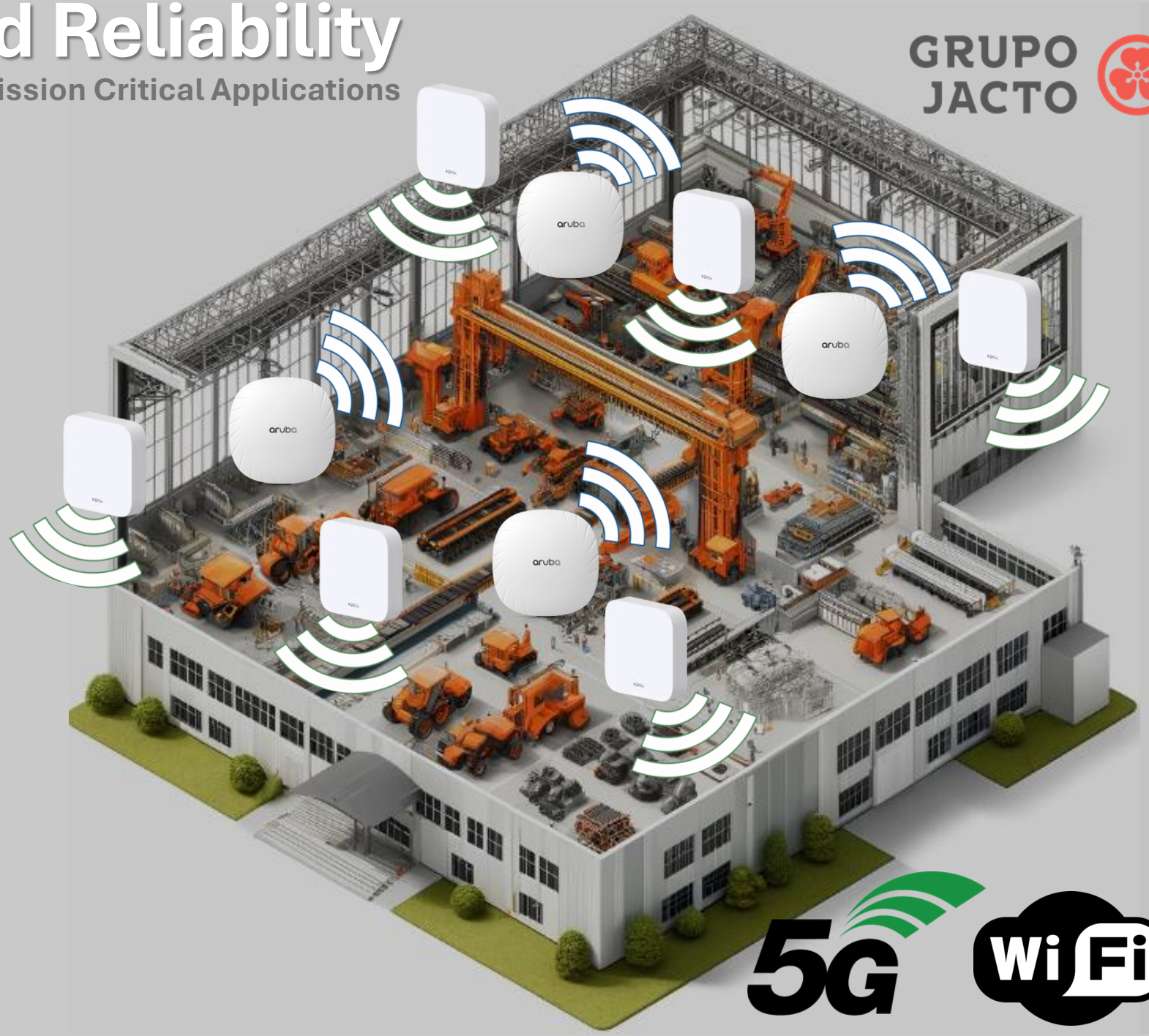
- Multipath Physical Route to 5G/4G/WI-FI Radios
- RF Design Focus For Redundancy and Disaster Recovery
- Redundant Wireless Technology
- Spare Parts

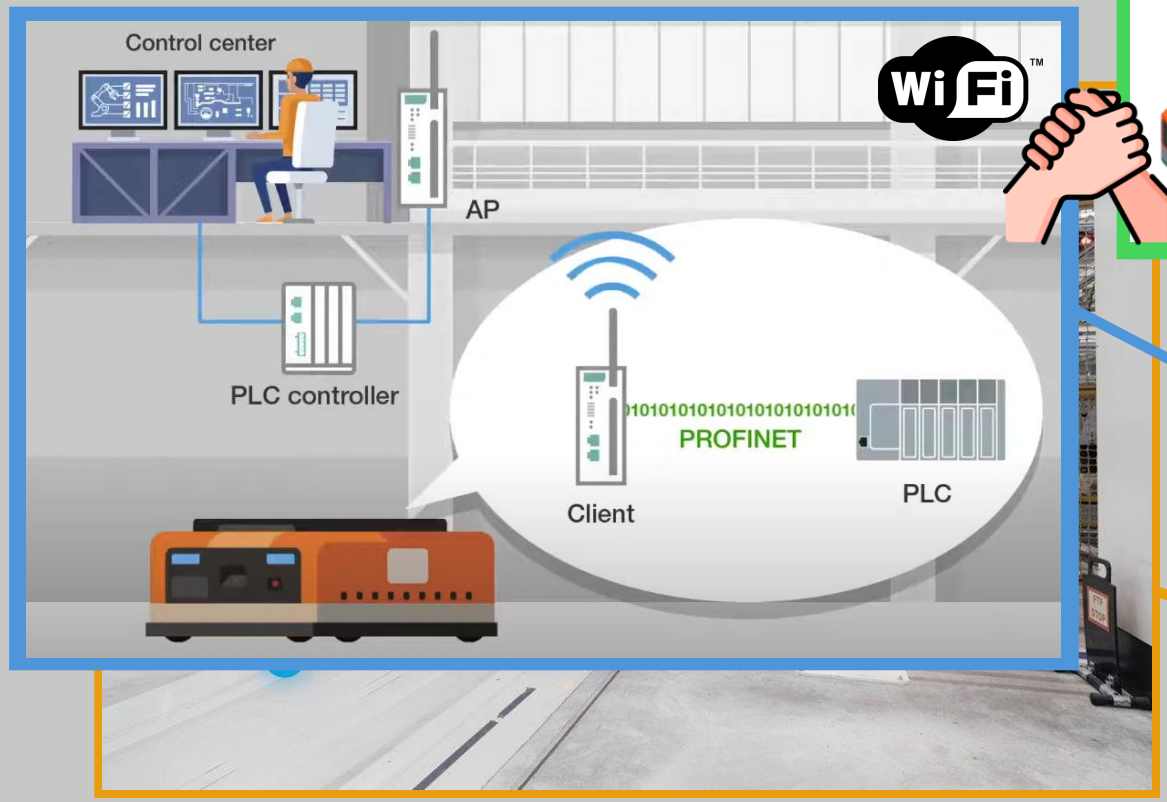


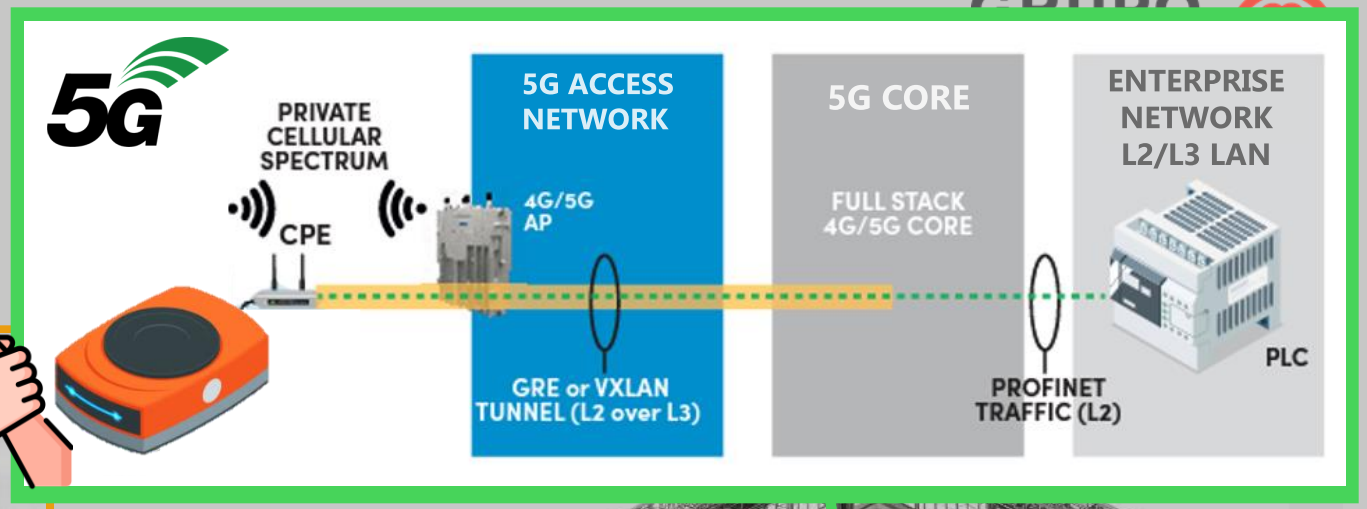
Mission Critical 5G Network

Use Case: AGVs, Data Colletor and 5G CPE

Use Case - AGVs

AGVs use 5G with WI-FI fallback





5G

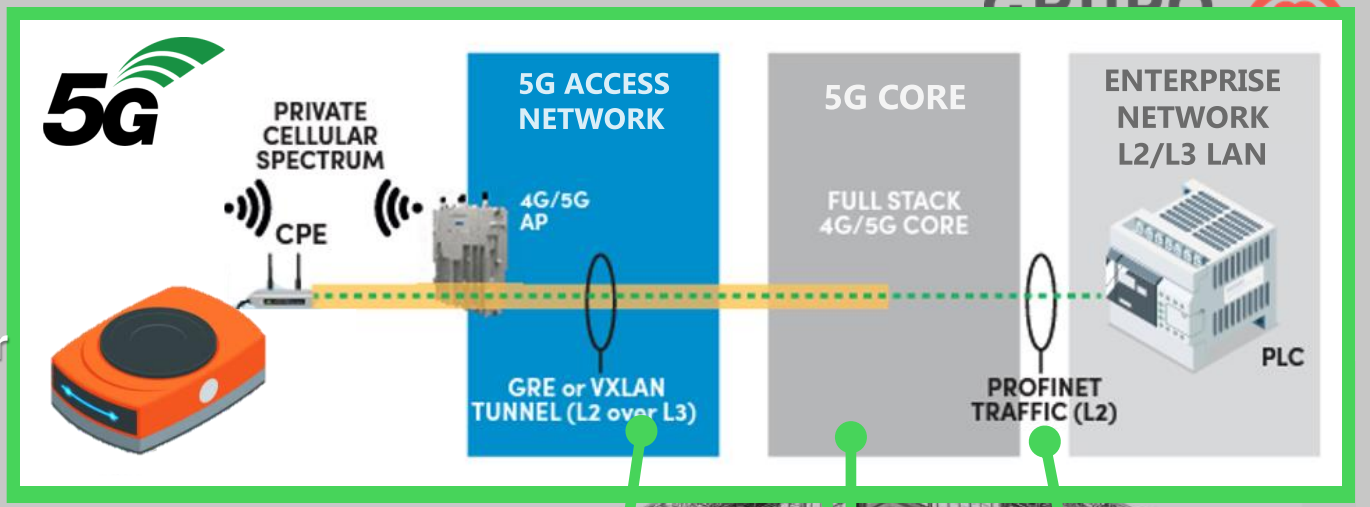
Use Case - AGVs

The Journey of Integrating AGVs with 5G Private Network

- PoC LTE/5G Lasted 40 Days
- PROFINET over 4G/5G/WI-FI Handover
- High Reliability & Availability
- GRE OR VxLAN Over 5G ? (Latency < 64ms)

- Review of the Network Solution Architecture
- For this use case, 5G, among other technologies, is an access network option for the AGV
- AGV's Quality of Service (QoS) & Prioritization
- PROFINET Over 5G and Wi-Fi working together with the AGV controller simultaneously, allowing for rapid switching between access networks when needed

- The solution architecture should be PROFINET over a 5G network with a single vendor



Use Case - AGVs: PROFINET OVER 5G & WI-FI

Mission Critical 5G Private Network Architecture PROFINET over 5G with WI-FI Fallback

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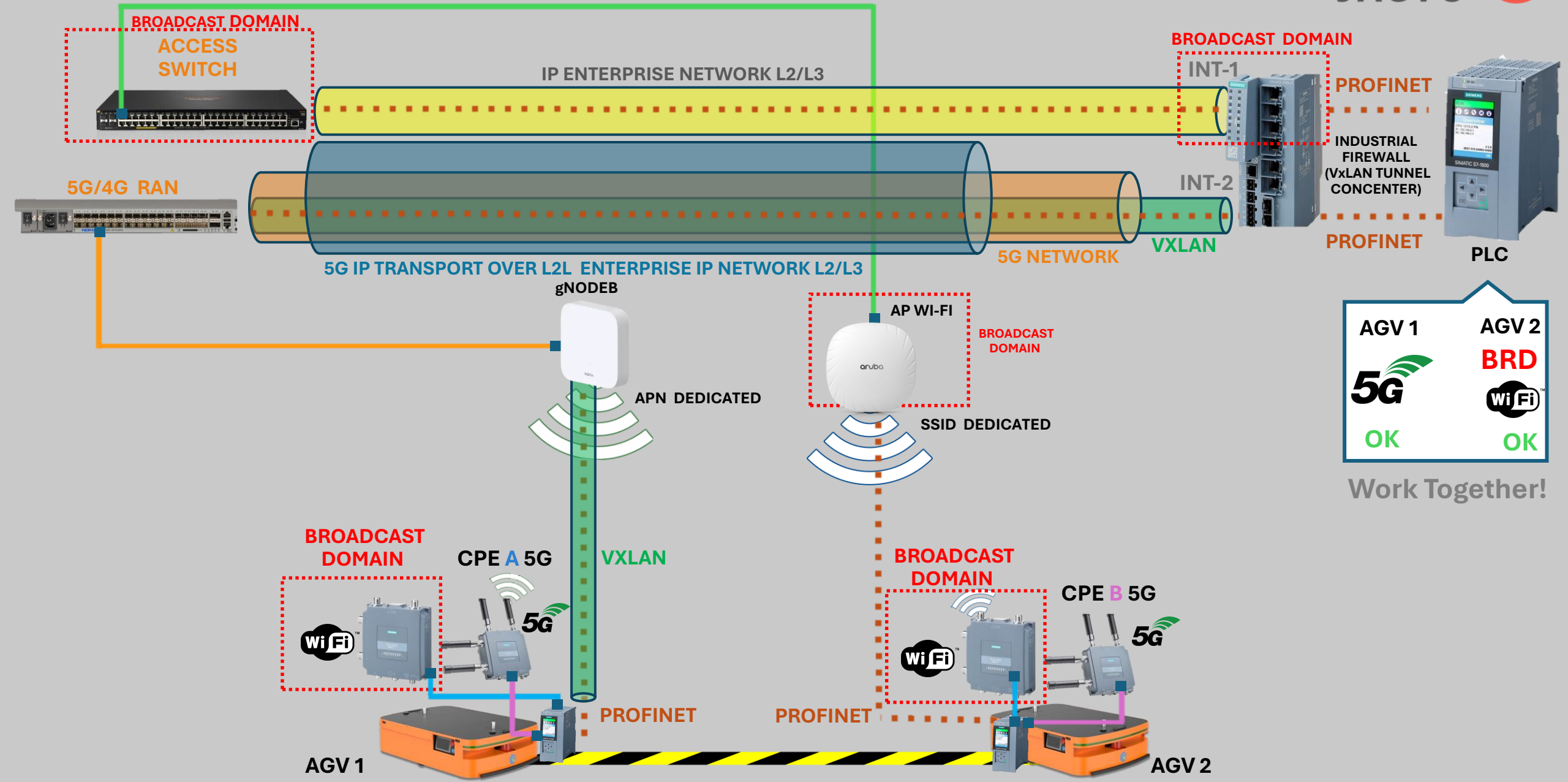

AGV 1	AGV 2
5G	BRD
OK	OK

Work Together!

Use Case – Data Collector & 5G CPE

Redundant Multi-Network Data Collector And 5G CPE Ensuring Continuous coverage

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- Rugged Industrial Data Collector
- Fast Swap Between: 5G/4G/WI-FI
- Third-Party VoIP Service over 5G/4G

- CPE 5G enables connectivity for non-5G-compatible equipment and provides temporary Wi-Fi over 5G for outdoor events and training sessions

5G

Mission Critical 5G Private Network
Key Challenges For The Future

Key Challenges For The Future

Mission Critical 5G Private Network Key Challenges for the future

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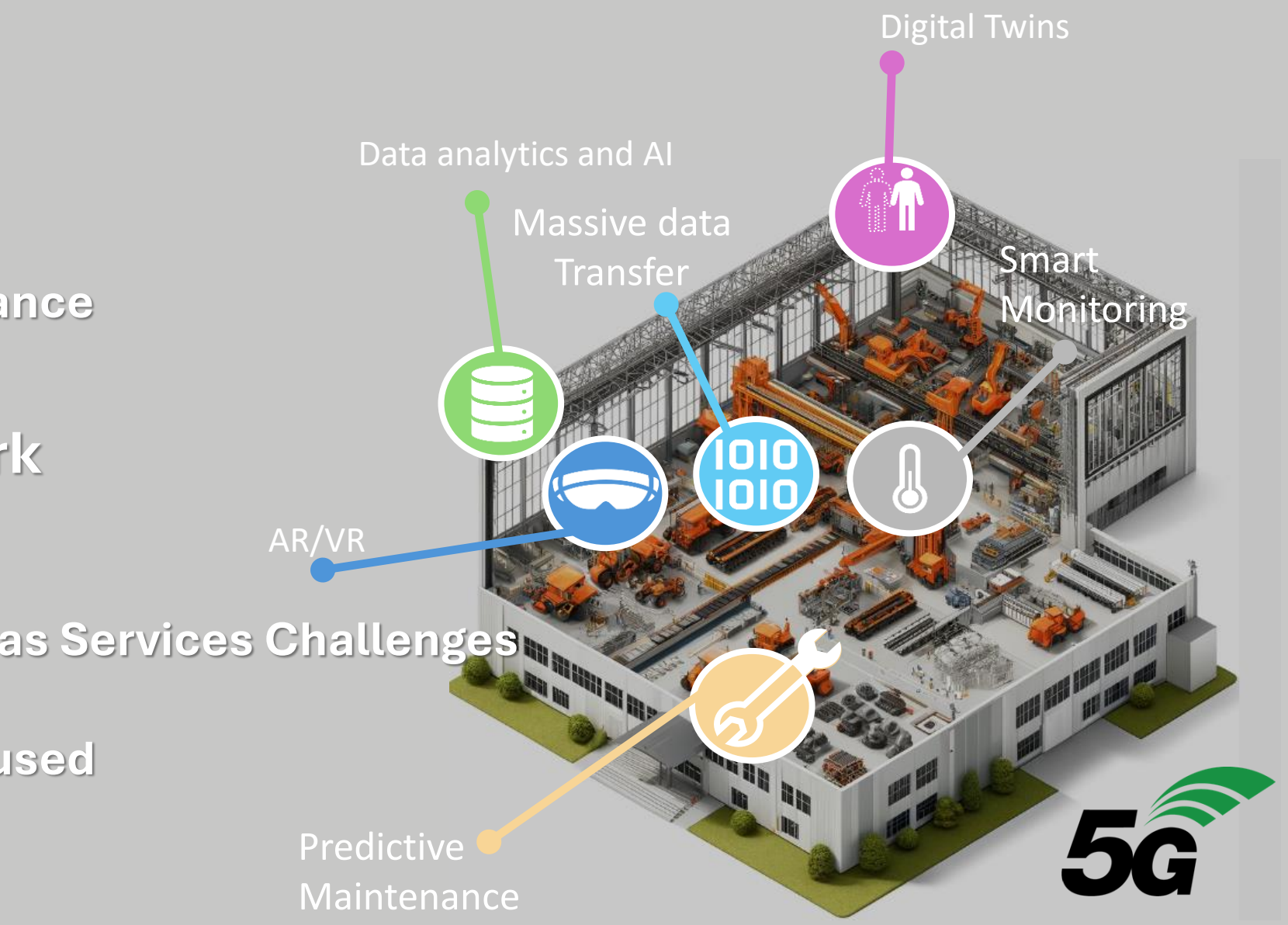
Smart Manufacturing

- Integration Industrial Protocols over 5G/4G
- Data Analytics and AI
- Smart Predictive Maintenance
- Video Analytics (QA)

LTE & 5G Private Network

- Cost , ROI, Added Value
- Data Analytics and AI
- LTE & 5G Private Network as Services Challenges
- Autonomous Operations
- Dynamic Allocation of Unused Network Capacity



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