The Physical Internet

Building a System of Logistics Networks

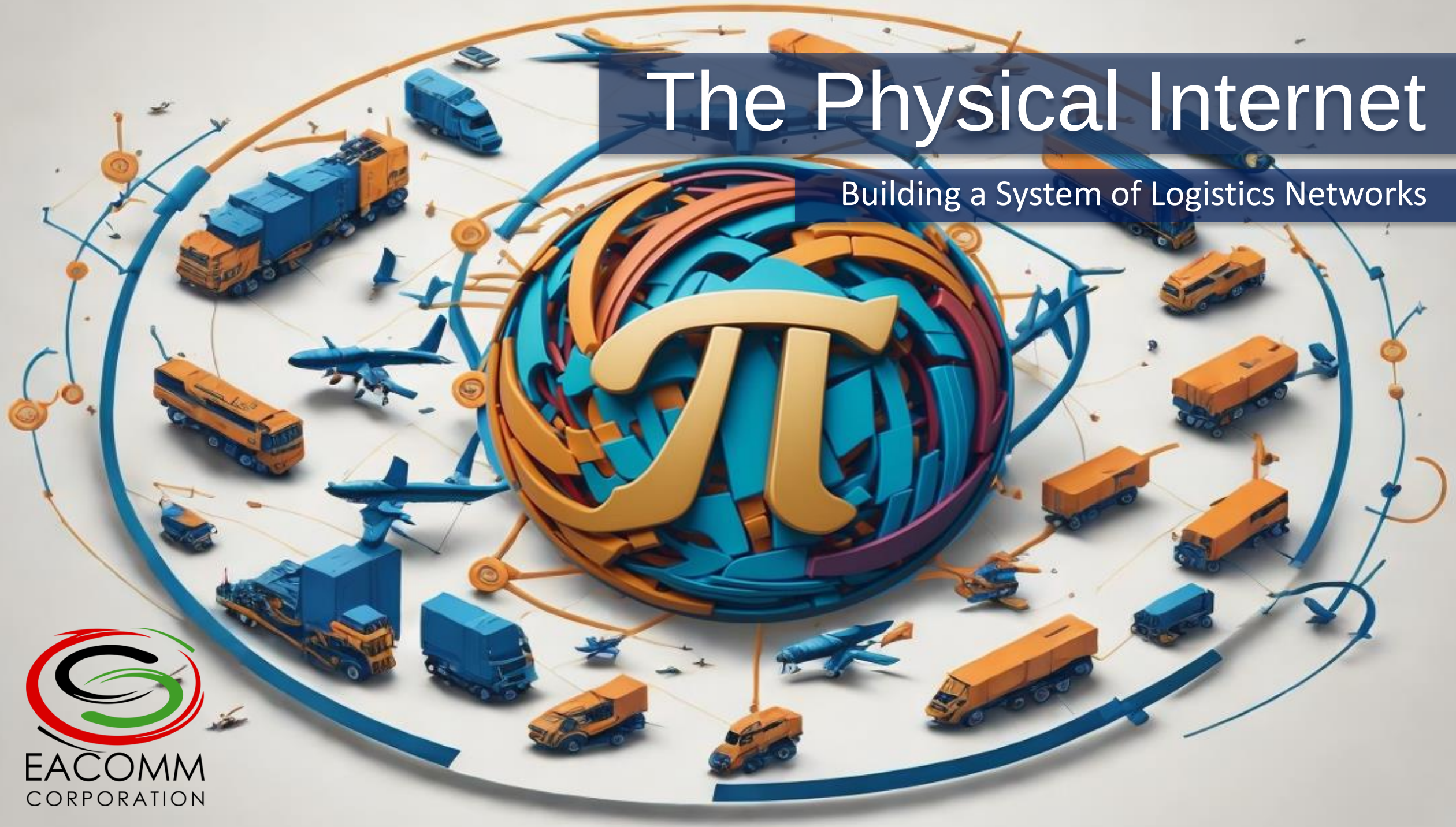

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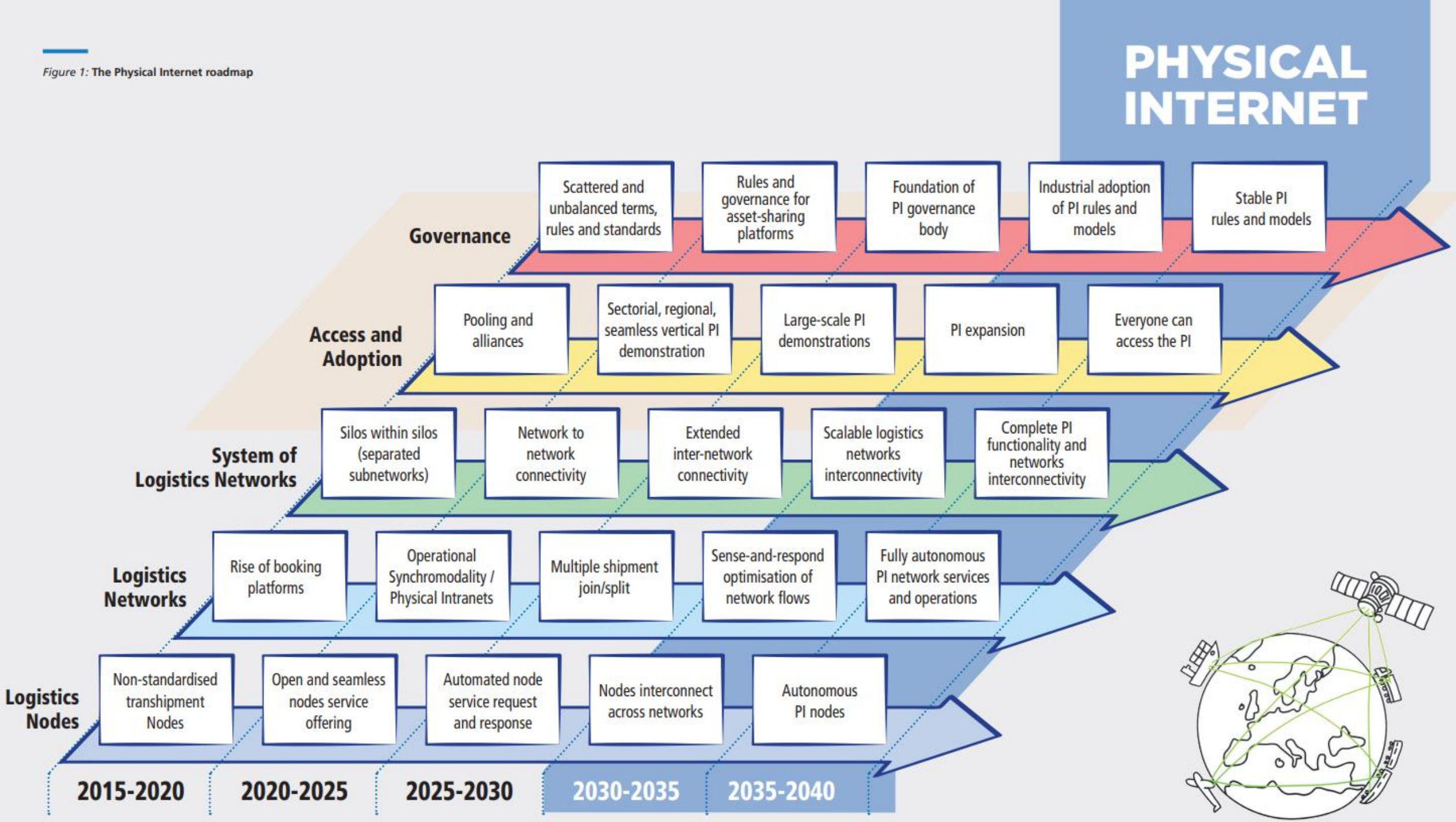
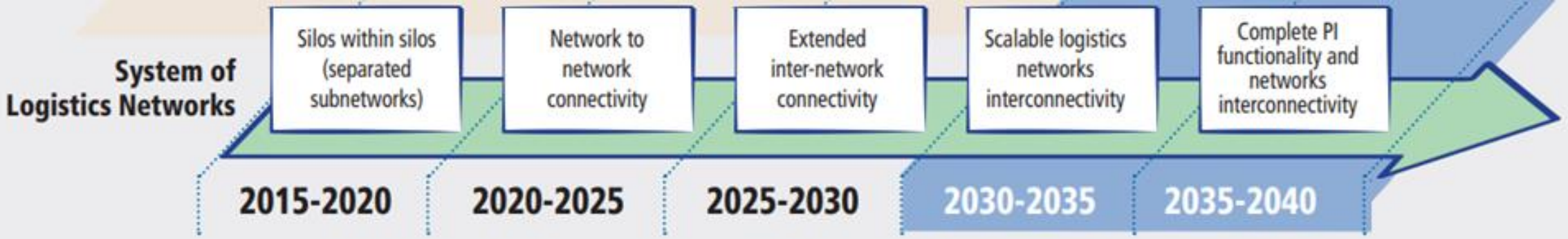
Figure 1: **The Physical Internet roadmap**





Building a System of Logistics Networks

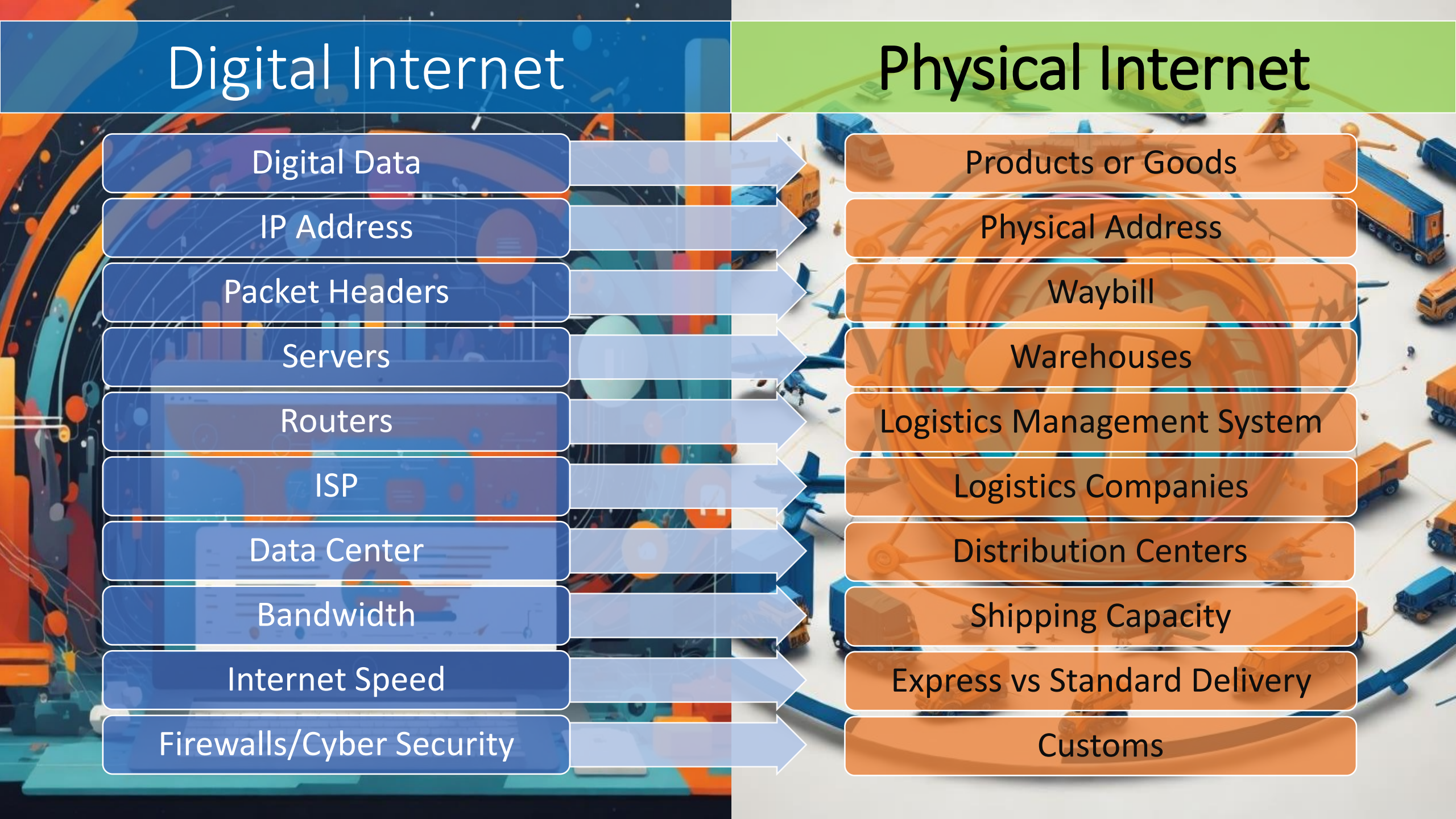
Network to Network Connectivity

Non-Standard APIs

Two-Party Agreements

PI Functionality

- ✓ Standardized APIs and Protocols
- ✓ PI standards compliance for LSPs
- ✓ Smart Contracts

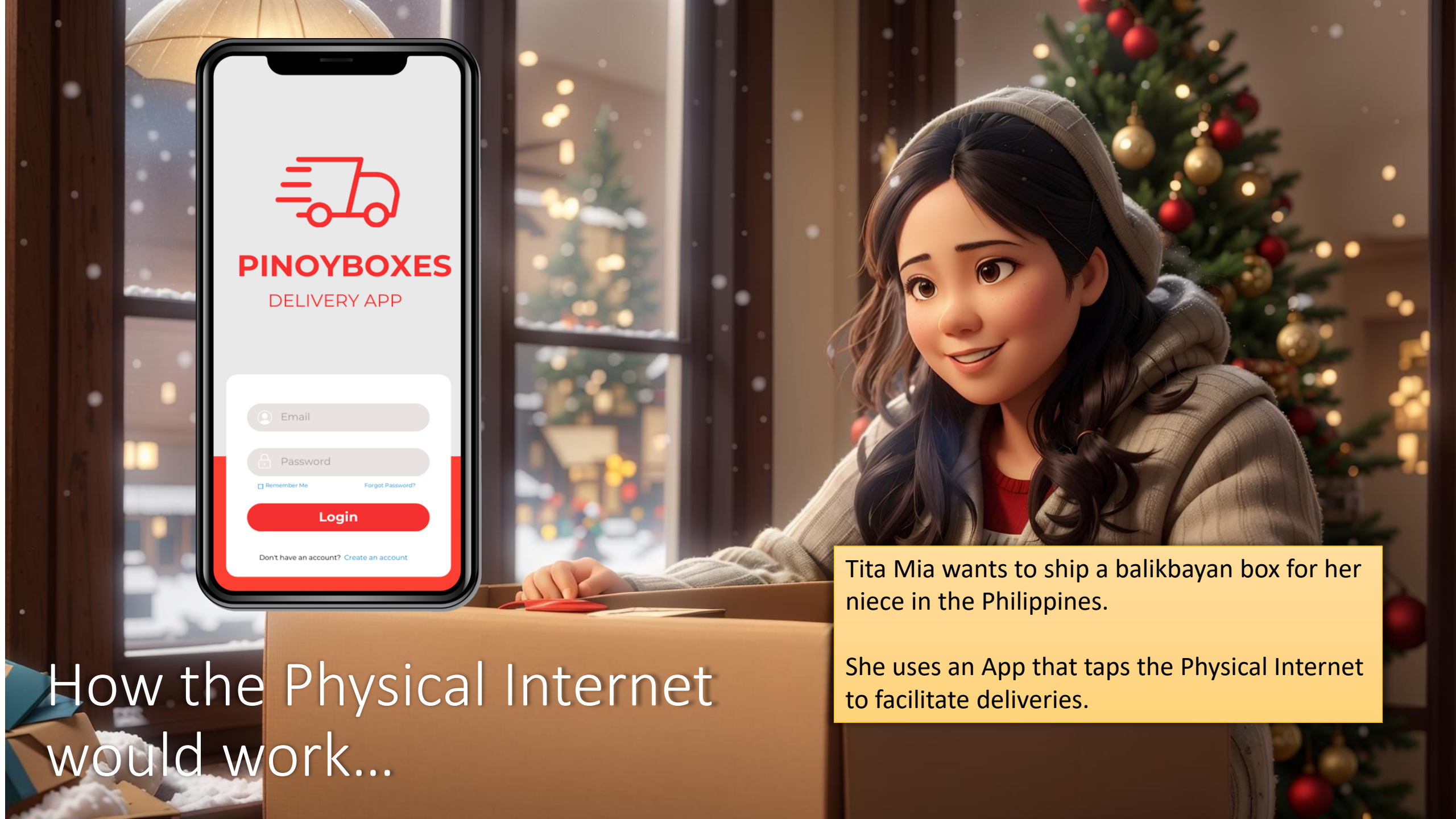

Digital Internet
Physical Internet
Digital Data
IP Address
Packet Headers
Servers
Routers
ISP
Data Center
Bandwidth
Internet Speed
Firewalls/Cyber Security
Products or Goods
Physical Address
Waybill
Warehouses
Logistics Management System
Logistics Companies
Distribution Centers
Shipping Capacity
Express vs Standard Delivery
Customs

Towards the Physical Internet

Products or Goods	Standardization of Packages
Physical Address	Geotagging of Addresses
Waybill	Standardization and Digitization (Blockchain/Smart Contracts)
Warehouses	Digital Twin: Geotagging, Capacity Monitoring, modes of delivery, etc.
Logistics Management Systems	Standardization of Protocols and APIs, new PI-native startups

Towards the Physical Internet

Logistics Companies	Automated, realtime information sharing using standard protocols and APIs
Distributions Centers	Creation of multi-tenant, multi-mode distribution centers
Shipping Capacity and Express vs Standard Delivery	GPS Tracking, route optimization, real-time capacity monitoring
Customs	Standardization of protocols and API, standardization of formats and rules, acceptance of smart contracts

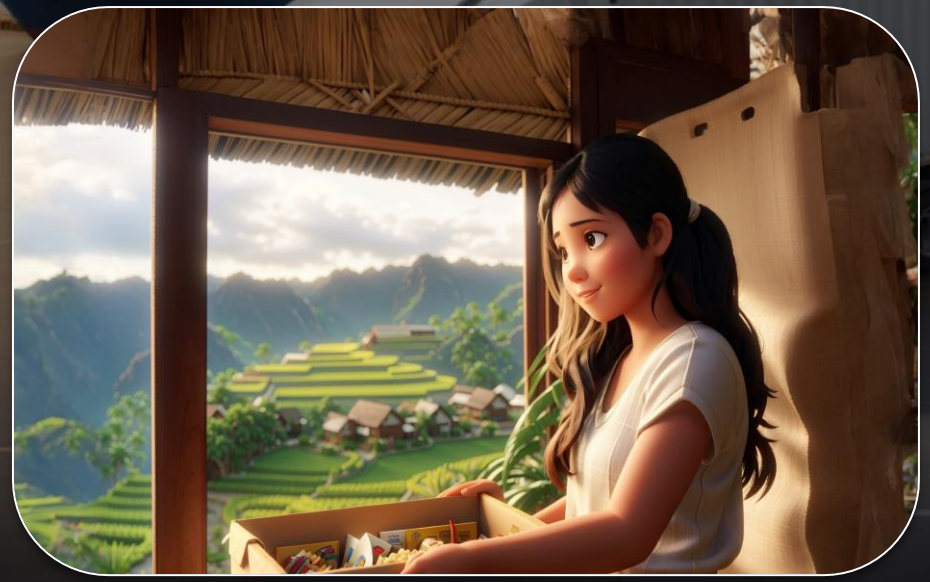


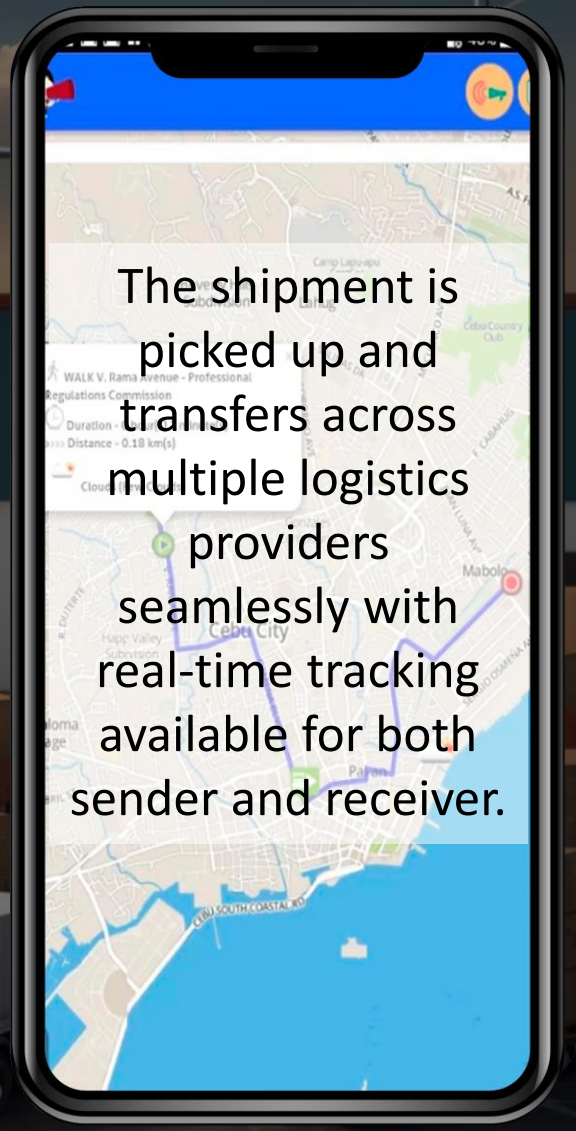
How the Physical Internet would work…

Tita Mia wants to ship a balikbayan box for her niece in the Philippines.

She uses an App that taps the Physical Internet to facilitate deliveries.

Pinoyboxes broadcasts the data to its logistics partners to find possible providers to facilitate the order. Multiple logistics partners provide price quotes and shipping details and multiple routes are determined sorted based on price, delivery date, carbon footprint, etc.




The shipment is picked up and transfers across multiple logistics providers seamlessly with real-time tracking available for both sender and receiver.

Building the System of Logistics Networks

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Variable Name	Value
Warehouse Name	PinoyBoxes Warehouse
Lat	14.60834
Lon	121.08070
Address	CyberOne Bldg. Eastwood Cyberpark
Capacity	10,000 cubic meters
Available Space	2,000 cubic meters
Modes available	Delivery Van, Motorcycle
Carbon Footprint	100 MT CO2e

Building Digital Twins

All aspects of the logistics networks would have a digital representation.

Geotagging of Warehouses and addresses

GPS tracking of vehicles

Capacity tracking of warehouses and vehicles

Carbon footprint monitoring

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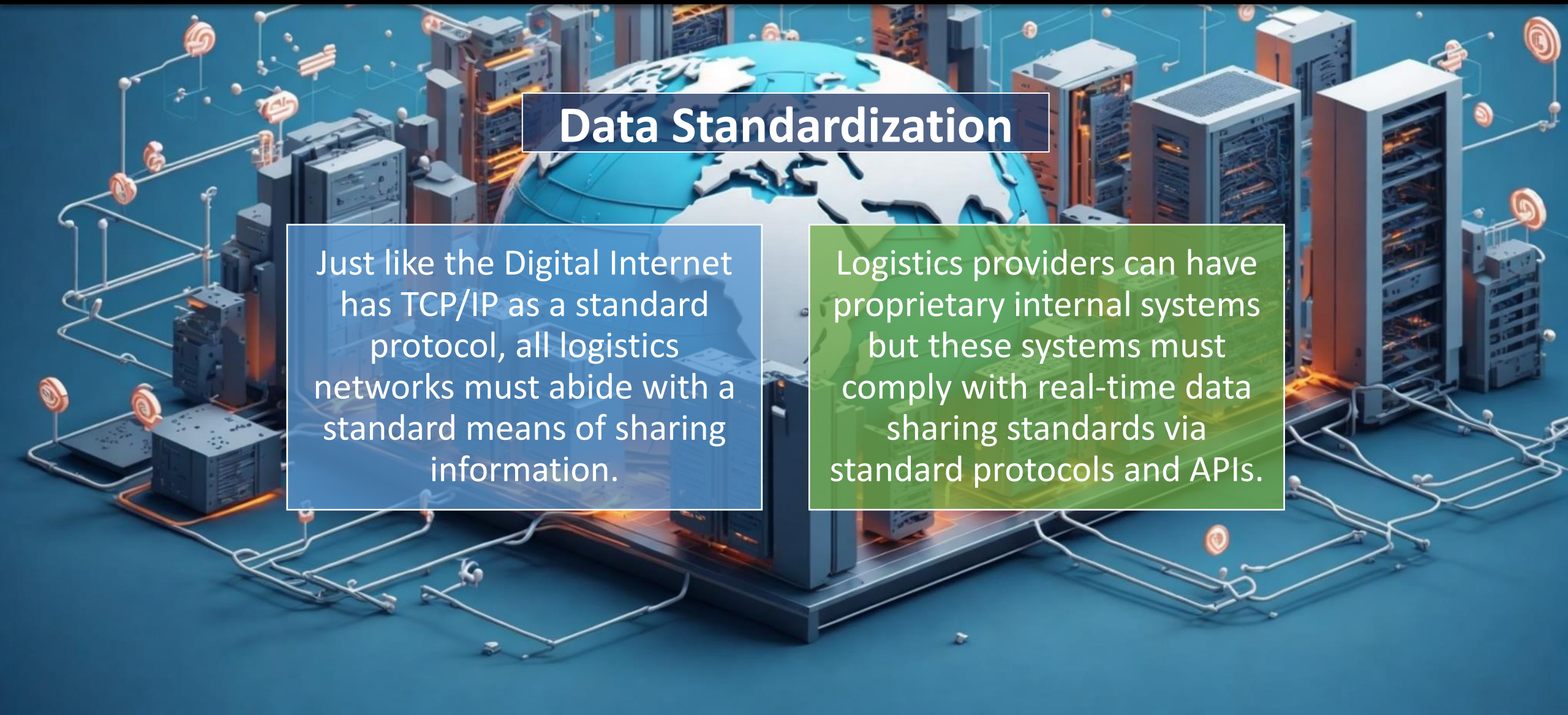


Data Standardization

Just like the Digital Internet has TCP/IP as a standard protocol, all logistics networks must abide with a standard means of sharing information.

Logistics providers can have proprietary internal systems but these systems must comply with real-time data sharing standards via standard protocols and APIs.

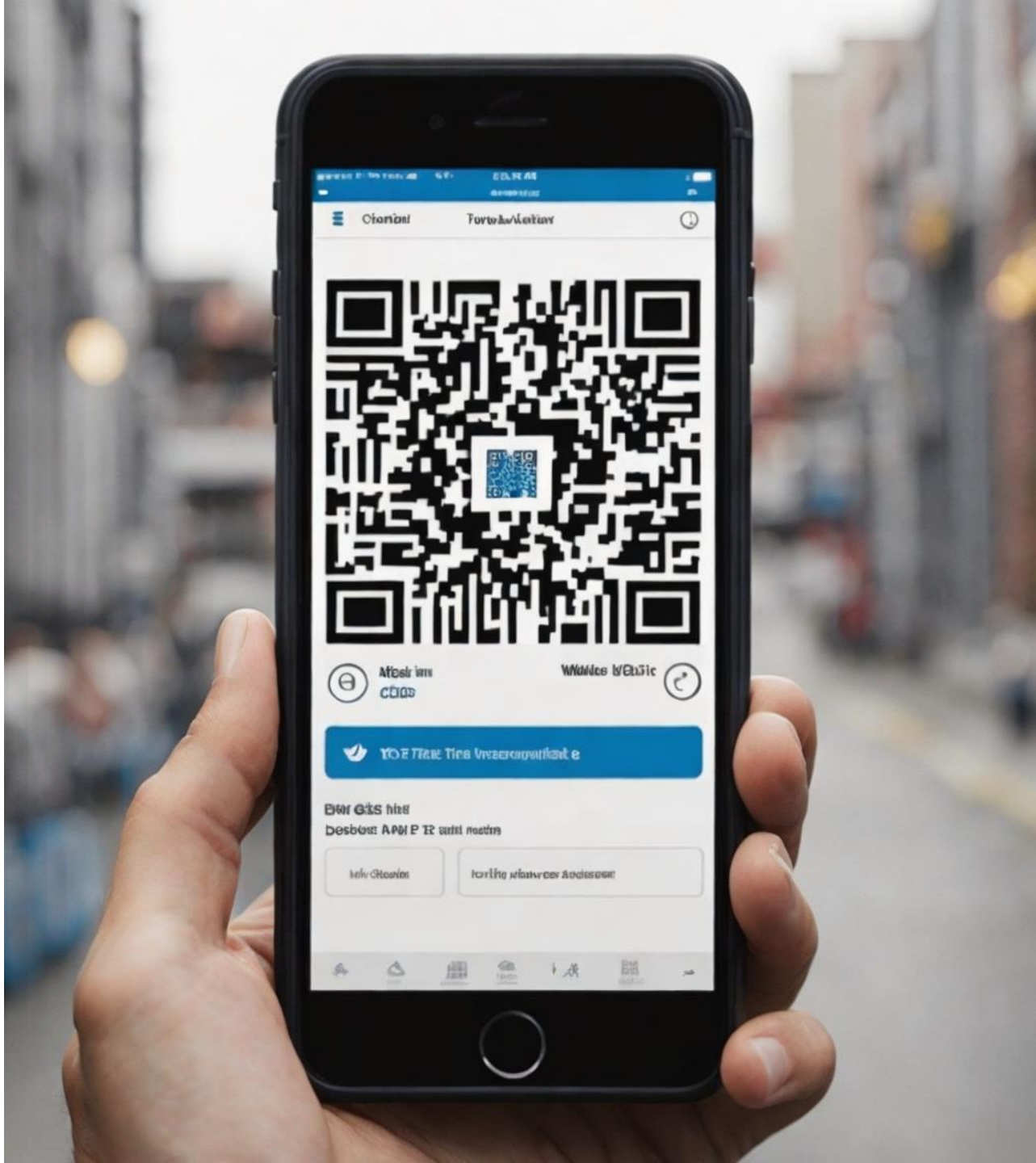
Building the System of Logistics Networks

Smart Contracts

A smart contract is a computer program or protocol that can automatically execute, control or document events and actions according to the terms of the contract.

Smart contracts will allow seamless and fully automated transactions between multiple players of the Physical Internet: Logistics Providers, Logistics Apps, Government Agencies, etc.

It can be built using **blockchain** distributed ledgers, allowing for no single point of failure. Each participant in the Physical Internet would have a copy of the smart contracts.



Building the System of Logistics Networks

Financial Technologies

Free and Secure Flow of Financial Data is critical to realize the Physical Internet.

Logistics Providers must be able to automatically conduct transactions with the customer, each other, and government agencies once triggered by the Smart Contracts.

Customs and other taxes must be easily computed upon generation of transactions.

Building the System of Logistics Networks

Artificial Intelligence

AI can make the Physical Internet run more smoothly by incorporating machine learning, data analytics, and generative AI in all aspects of the system:

Route Optimization with Traffic Monitoring: Extend the use of AI-driven algorithms like Google Maps or Waze when planning pick-ups and drop-offs to include multiple logistics providers.

Load planning and balancing: Automated planning and balancing of cargo vehicles and warehouses.

Demand Forecasting: Predict seasonal demand variations in logistics.

Building the System of Logistics Networks

Internet of Things

Warehouse Sensors	CCTV, environmental sensors and shelf sensors can automatically detect warehouse conditions and capacity in real-time.
QR Codes and RFID	Automated scanning of QR codes or RFIDs can automate package routing and warehouse storage.
GPS Devices	GPS monitoring of vehicles will provide real-time feedback on the movement of goods.
Energy Tracking	IoT sensors on warehouses and vehicles can provide real-time monitoring of energy and carbon emissions
Environmental Sensors	Sensors deployed in warehouses and vehicles can provide feedback on ideal environmental conditions, especially for perishable and fragile goods.
Autonomous Robots and Vehicles	Autonomous warehouse robots and deliver vehicles will significantly increase warehouse and logistics efficiency.

Challenges that the Physical Internet Face

Substantial Investments in Infrastructure and Technologies

Global Coordination and Collaboration

Adaptation and Transition

Data Security

Sustainability

Political Will

Adopting the Physical Internet Paradigm will greatly improve the efficiency of Logistics

The technologies needed to create the Physical Internet are readily available

The Philippines has the technological expertise to deploy and support the Physical Internet

Laying down the Foundations of the Physical Internet

EACOMM has been working on various technologies over the past two decades that are needed for the Physical Internet:

- IoT Sensor Monitoring
- GPS Monitoring
- Route Optimization
- Generative AI
- Logistics Integration
- Inventory Management
- Design and Development of APIs
- Blockchain
- Payment Gateway Integration

THANK YOU!

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