Housekeeping

- Audience will be muted

- A question & answer session will follow the presentation

- Submit questions by clicking the Q&A icon at the bottom of your screen

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Today's Presenters

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Agenda

- Current State of Fleet Industry
- Future Opportunities
    - Business Trends
    - Demand Trends
    - Technology Adoption Trends
    - Advanced Telematics Solutions
- Fleet Market Segments and Use Cases
- Ecosystem
- Trends in North America
- Define Edge Computing
- Portfolio : Edge to Core
- Lenovo OEM & ISV Partner Program

Current State of Fleet Industry

Industry Segments of Intermodal Supply Chain

- Cargo Container
- Cold Chain & Reefer (Temperature controlled transport units)
- Bulk and Liquid Carrier
- Last Mile Delivery

Current Application of Telematics

- Increased penetration of IOT Devices (decentralized, point solutions, no orchestration or analytics)
- Driver Management
  - Driver scorecards
  - Driver safety
- Fleet or Asset Management
  - Monitoring equipment usage and behavior
- Tracking and Wayfinding
  - Geolocation tracking and mapping
  - Navigation
- Safety and Compliance
  - Usage or emissions monitoring
  - Emergency shut down

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Future Opportunities

Increased demand for prescriptive automation and analytics (12% for Vehicle Telematics from 2022-2023)

- Fleet Industry is being transformed by electrification and interest in autonomy

- Worldwide population growth and rising e-commerce demands

- Global Transportation Management System market size expected to reach 6.6B by 2026

- Commercial Vehicle Market in North America expected to grow from $13.8B in 2023 to $36.2B in2032

Source: Harbor Research

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Future Opportunities

Technology Trends Driving Adoption

- Increased investment in AI drives use of applications that use machine learning, computer vision, etc.

- Vehicle Electrification/ Fleet Sustainability Monitoring require more intelligence at the edge
  – Vehicle sensing platforms
  – Enterprise management systems
  – Cybersecurity infrastructure

- Digital Twins to model supply chains
  – Need for real time data and connectivity
  – Improves operational efficiency

- Fleet Data Exchange
  – Explosive demand in workforce needs (430k alone in 2021)

- Edge AI and Machine Vision
  Increased presence of large-scale operations and data driven decision making

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Future Opportunities

Business Trends Driving Adoption

- Cost
  - Higher costs of labor, fuel, goods

- Visibility
  - Need for better demand signaling
  - Desired integration into customer and supplier systems

- Competition
  - Increased competition in last mile delivery space
  - Fulfillment off fast delivery commitments

- Efficiency
  - Lack of end-to-end supply chain visibility
  - Limited view of bottlenecks, such as goods stuck at ports of entry
  - Insufficient route planning
  - Lack of visibility into inventory availability

Source: Harbor Research, ABI Research

Future Opportunities

Advanced Telematics Solutions

- Use cases can be customized and managed from single platform/edge device

- Aggregate and inference complex AI, ML workloads and data types

- Advanced, after market solutions can be applied to fleets with diverse vehicles

- Powerful, ruggedized onboard computers (edge devices) can handle multiple, complex workloads and capture data for near real-time or future decision making
  - Multimodal data types including video, temperature, vibration, vehicle analytics, telematics, etc.)

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Future Opportunities

How does the ecosystem work?

- AI and ML driven solutions need various players to enable deployment of end to end solutions
  - Network and specialized component providers
  - ODMs and OEMs
  - ISVs and SIs
  - Fleet owners, Freight carriers, 3PLs

- Must provide connectivity, cloud, and software even in remote or rugged environments
  - Compute at the edge
  - Alerts for drivers, operators, and data can be sent back to command centers, warehouses, etc.

- Collaboration between industry players allows for more rapid deployment

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North American Intermodal Shipping Opportunities

Overall Trends/Growth Areas

- Recent supply chain challenges exposes vulnerabilities
- Strategic fleet management to improve visibility and deployment
- Real-time situational awareness and predictive decision making
- Optimized supply chain orchestration to avoid backlogs
- Integrated AI transportation systems
- Real-time cooperation and planning

North American Trends

- Increased regulations motivate investment in new technologies
- Push towards autonomous operations
- Environmental Impact Goals
- Canadian Fleet Transformation
- 12% Increase in demand for Telematics Applications
- 19 Jurisdictions in the US and Canada have signed pledges to expand electrification of medium/heavy-duty trucks by 2030 (30% of sales)
- Number of vehicles shipped in NA expected to grow from 5.3M in 2023 to 13M in 2032

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Source: Harbor Research

What Intel ®Offers

Increased intelligence at the edge can be added to new and existing vehicles

- Intel® powered solutions at edge roadmap covers major fleet use cases and sub-segments, optimized for Intel ® CPUs, iGPUs, and XPUs
    - Workload consolidation can combine sensor capture for AI, ML, and data analytics
    - Enables development of solutions to address top customer concerns
- Scalable solutions that help accelerate deployment of intelligent devices
- Better security because multiple devices replaced by single, Intel powered edge device
- Unites disparate solutions, processes, and functions on single, ruggedized in-vehicle computer
- Allows simplification via a containerized, analytics platform
- Modular approach supports multiple systems and vehicle types
- Accommodates range of use cases that can be customized or expanded in the future to meet new requirements
- Reduced labor and maintenance because of single platform access
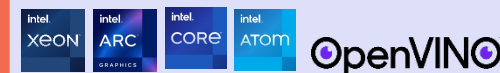
Fleet Market Segments and Use Cases

Segment	Commercial (Cargo, Freight)	Public	Industrial
Segment Specific Use Cases	• Cargo Monitoring • Cold Chain Management • Cargo Optimization	• Collision Reconstruction and Asset Management Data • Efficient Equipment Allocation • Field Service Management	• Yield and Harvest Monitoring • Adjacent Operations Management • Autonomous Equipment Operation
Horizontal Use Cases	• Fleet Location Tracking • Route Planning • Data Collection and Analytics	• Predictive Maintenance • Fuel Management • Worker Safety Monitoring • Theft Prevention	• Near Real-Time Alerts • Integrated in-cab Communications • Asset Tracking

Intel-powered solutions address key Fleet customer concerns

| Concern	Benefits	Capabilities	Intel Ingredients
Safety	Drive monitoring & coaching	Camera & Sensor capture, AI/ML, Sensor fusion	intel XEON · intel ARC GRAPHICS · intel CORE · intel ATOM · OpenVINO
Efficiency	Reduced waste & increased operational efficiency	Leverage edge compute to aggregate sensory data & perform analytics	intel XEON · intel ARC GRAPHICS · intel CORE · intel ATOM · OpenVINO
Fuel Costs	Route optimization & enhanced fuel efficiency	Combine sensor capture with ML, AI, & data analytics	intel XEON · intel ARC GRAPHICS · intel CORE · intel ATOM · OpenVINO
Predictive Maintenance	Reduced downtime, increased uptime	Combine sensor capture with ML, AI, & data analytics and capture malfunction patterns before failure	intel XEON · intel ARC GRAPHICS · intel CORE · intel ATOM · OpenVINO
Availability	24/7 availability through ruggedized design	Hardened design capable of withstanding vibration, extra temps, harsh conditions, water ingress, dust	Extended product lifecycle
Reliability	Enhanced availability through improve serviceability	Redundant storage provides enhanced reliability	OpenVINO
Security	Security enhanced technologies to maintain integrity	Secure solution that operates with authorized software and devices	OpenVINO
Flexibility	Increased through optimized labor, automation, 24/7 availability	Flexible design reusable across segments, with reduced TTM and ROI	intel XEON · intel ARC GRAPHICS · intel CORE · intel ATOM · OpenVINO

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Trends in AI: The future of AI will be hybrid
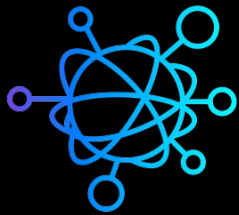
Explosion of Data

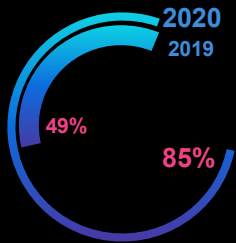By 2025 the global datasphere will exceed

175ZB

33ZB
2019

175ZB
2025

Market Growth

$38B
Software

$42B
Services

$110B
by 2023

$30B
Hardware
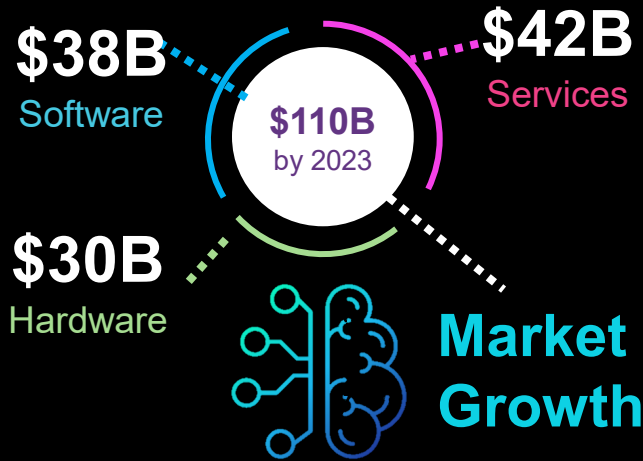
Surging AI Investment

75B

VC investment in AI – **20%** of total WW

Enterprise AI Adoption

Enterprises stage of adoption

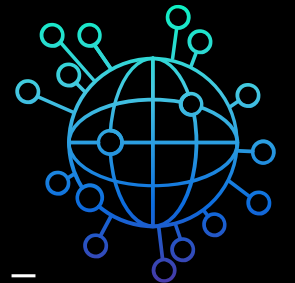2020
2019

49%

85%

Significant growth in enterprise AI adoption

Edge AI

28%
of AI hardware will be at the edge.*

Fragmented Ecosystem

22K
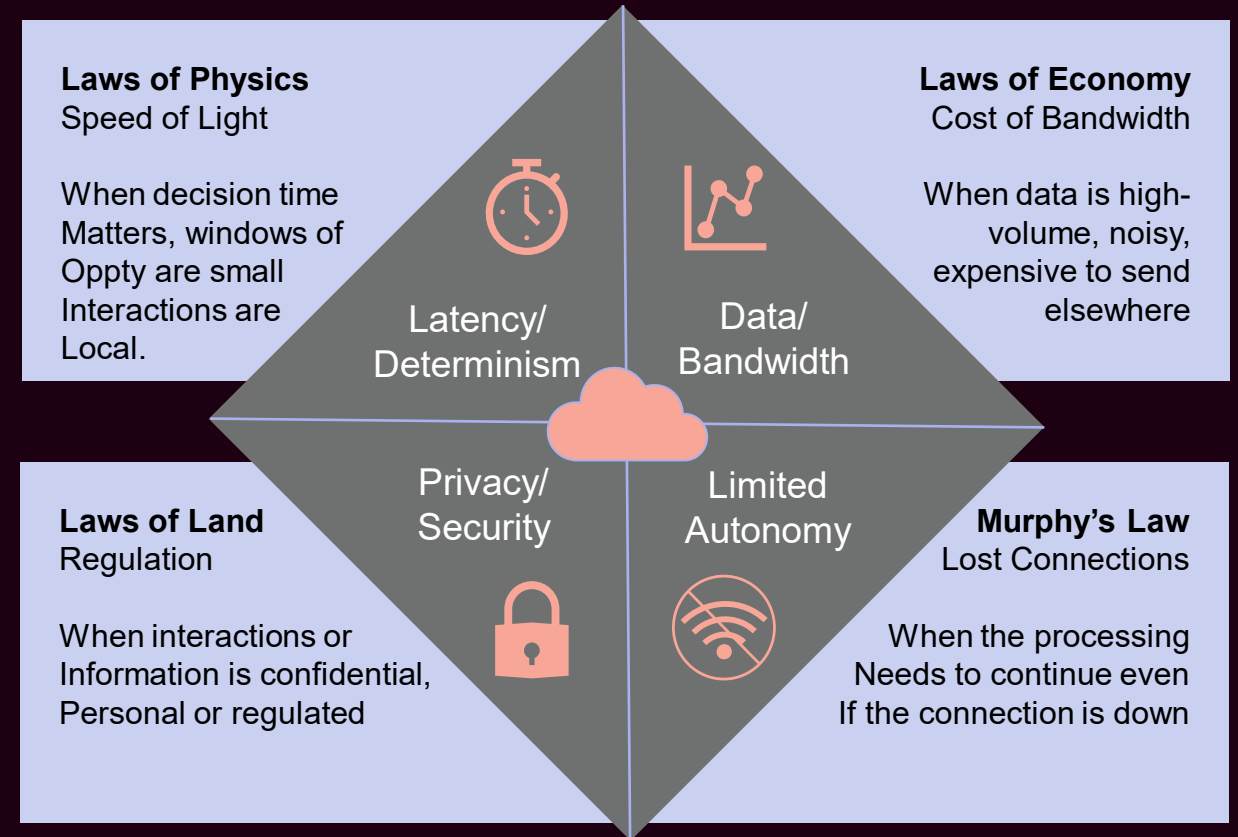
AI ISVs Worldwide – **250** raised more than **100M** USDs

Edge Computing

What is it?

❖ Computing capacity **outside of the Datacenter**

❖ Closer to where data is **generated** and **acted** upon. Often data collected by cameras and sensors – not keyboard/mouse

❖ Highly **Distributed**

What drives it?

Laws of Physics
Speed of Light

When decision time
Matters, windows of
Oppty are small
Interactions are
Local.

Laws of Economy
Cost of Bandwidth

When data is high-
volume, noisy,
expensive to send
elsewhere

Latency/
Determinism

Data/
Bandwidth

Privacy/
Security

Limited
Autonomy

Laws of Land
Regulation

When interactions or
Information is confidential,
Personal or regulated

Murphy's Law
Lost Connections

When the processing
Needs to continue even
If the connection is down

Edge computing has unique requirements…

Environmental

- Wide temperature
- Shock & vibe
- Dust filtering & fanless
- Low acoustic
- IP protection

Security

- Encrypted data
- On-site authentication
- Movement & tamper detection
- Physical Security

Continuity

- Diverse connectivity
- Optimized performance
- Redundant operation

Management

- Single tool for DC & edge
- Automate deployment
- Lifecycle Management

Portfolio Overview - From Far Edge to Core

Edge Client

SE10
- intel ATOM
- -20C to 60C
- ATOM
- Up to 32 GB RAM

M90n-1
- intel CORE i5
- 0°C to 50°C
- Celeron, i3
- Up to 8GB RAM

SE30
- intel CORE i5
- -20°C to 60°C
- Celeron, Core™ i3, i5
- Up to 16GB RAM

SE50
- intel CORE i7
- 0°C to 50°C
- Core™ i5, i7
- Up to 32GB RAM

Edge Server

SE350*
- intel XEON D
- 0°C to 55°C
- Xeon® D-2100
- Up to 256GB RAM

SE350V2
- intel XEON D
- 0°C to 55°C
- Xeon® D-2700
- Up to 256GB RAM

SE360V2
- intel XEON D
- -20°C to 65°C
- Xeon® D-2700
- Up to 256GB RAM

SE450
- intel XEON
- -5°C to 55°C
- Xeon® SP 3rd Gen
- Up to 1TB RAM

Datacenter

ThinkSystem
- intel XEON
- 0°C to 35°C

Gateways	Base Station / DC Closet	Data Center

Diverse Portfolio
From ultra compact gateways to data center grade products.

Highest Performance
CPU & GPU rich systems for ultimate performance.

Flexible Deployment
In harsh environments with ruggedized devices & unique cooling capabilities.

* SE350 will continue to be available until 3/31/2025

Common Management Tool across ThinkEdge: XClarity Administrator for Infrastructure Management

- **Reusable Patterns and Policies**
  - Configuration Patterns
  - Jump start provisioning with pre-defined UEFI settings
  - Firmware level policy management streamlines ongoing maintenance

- **Real-Time Monitoring**
  - Forward alerts, emails, and events
  - Call Home to create service tickets
  - Centrally launch remote control sessions to manage endpoints as if you were at the local console
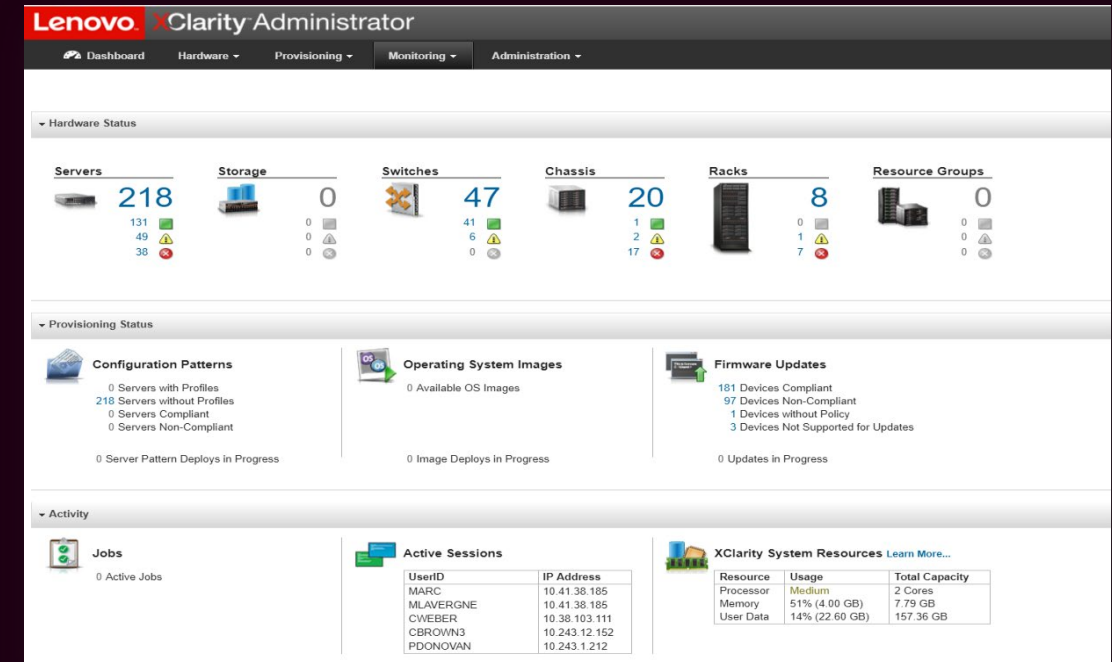
- **Automated OS installation**
  - Minimize manual steps with scalable installation of hypervisors and operating systems to multiple bare metal servers

Edge Infrastructure deployment automation for Servers:
Lenovo Open Cloud Automation

Problem statement

- Initial roll-out and installation: many geographically dispersed sites requiring lots of trips to deploy and synchronous work between field and HQ engineers.

- Day to day maintenance: Regular firmware & BIOS updates, new versions of OS, cloud SW, security patches, etc.

- Lack of skilled engineers in each edge location.

Solution

Lenovo Factory
Lenovo ships servers without customizations

Staging
Skip Staging environment

Edge location
Cloud Platform SW is automatically installed and maintained, remotely
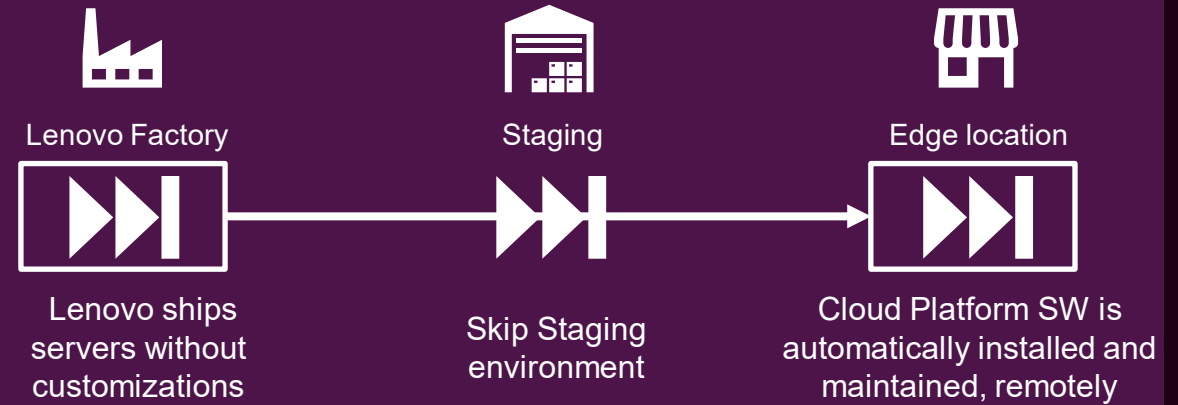
How we do it

- Secure nZTP Process for Lenovo Edge devices leveraging core Lenovo IP, unique device database, and capabilities of Edge servers.

- Use true out-of-band management to boot and deploy customized or standard OS images directly on bare-metal.

- Install Cloud Software automatically from remote location using Infrastructure as Code and GitOps industry best practices

Customer Benefits

- **Avoid logistic hops, save on shipping, reduce lead-time and carbon footprint**

- **Eliminate factory OS golden images pre-load for greater agility and flexibility**

- **Infrastructure always has latest software version, without the need for staging environment or heavy field engineer fleets**

Lenovo OEM Benefits
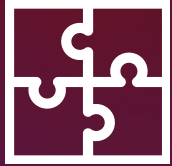
Full OEM Portfolio of Offerings

- Commercial product offerings including PCs, Smart Edge Gateways, Tablets, Servers, Storage, Networking & 3rd Party offerings.

- Extended Life Program: providing 3-5 years, lifecycle across multiple platforms.

- Global warranty and premier services

Global OEM Specialization

- Dedicated OEM sales specialists with global and regional coverage.

- Dedicated engineering resources focused on innovation for your solution development needs.

- Vertical positioning and industry expertise

OEM Capabilities

- E2E program management for your solution.

- Multi-level customization services, including blank chassis, bezels, packaging, logos, documentation, WW Label, imaging and global deployment services.

- Strategic technology partnerships, including Intel IOTG Solution Alliance, RFP Ready Kits and Market Ready Solutions.

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Q&A

Please enter your questions using the Q&A button

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Thank you for joining us!

More information about IANA:

- Intermodal EXPO Registration is OPEN!
- September 11-13, 2023, in Long Beach, California

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THE CONNECTING FORCE BEHIND INTERMODAL FREIGHT