

Urban Connected Automated Shuttle Systems (UCASS) & Smart Mobility

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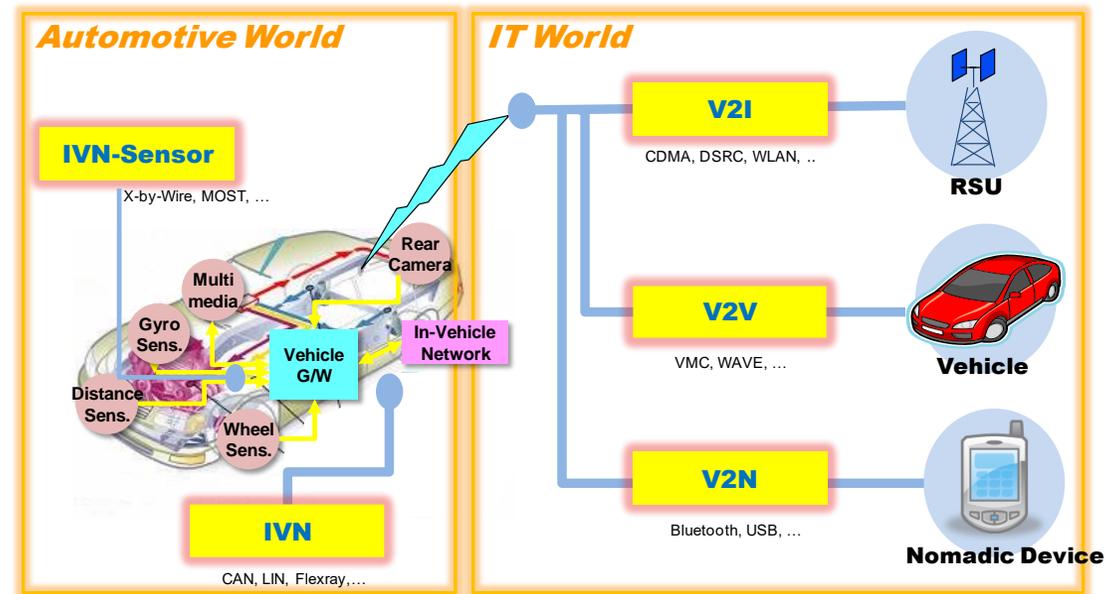
Transport Issues

☞ Sustainable Transport

- To be **Safe, Accessible, Affordable, & Environment Friendly**
- Paradigm Shifts for Reducing
 - ✓ Congestion, Road Accidents, Emissions & Air Pollutions, Health Problems
 - ✓ by
 - Avoiding the Needs to Travel by Driving Alone
 - Shifting to **Sustainable Transport Modes**
 - Improving Efficiency of All Transport Modes

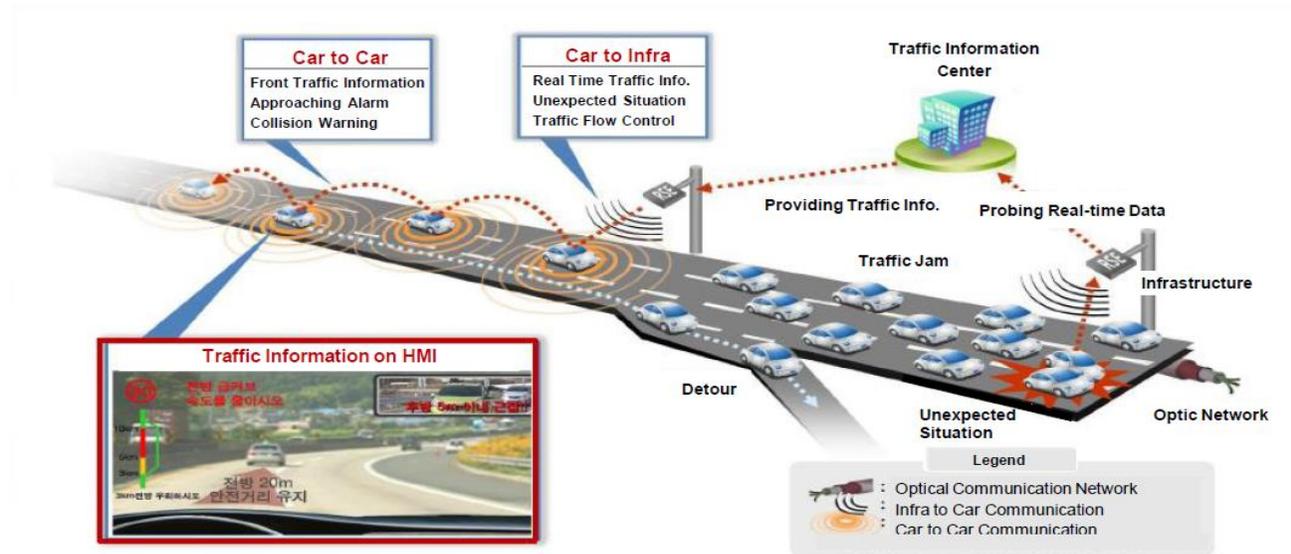
Vehicle to Infrastructure Connectivity

- Vehicle & ICT Convergence for V2X (V2I, V2V, V2N, V2P) Connectivity
- Cooperative Intelligent Transport Systems (C-ITS)



Cooperative ITS (C-ITS)

- Cooperative ITS (C-ITS) Pilot Project in Korea for V2X Connectivity
 - Focusing Safety, Promoting Mobility & Sustainability (Green Transport)
 - Next Generation ITS to provide a service on the open platform utilizing Big Data
 - Sejong-Yusung (Pilot until 2017), Seoul & Jeju (2018-2019), Ulsan & Gwangju (2020), etc.



Digitalization Infrastructure

Challenges of a resilient investment environment for transport systems

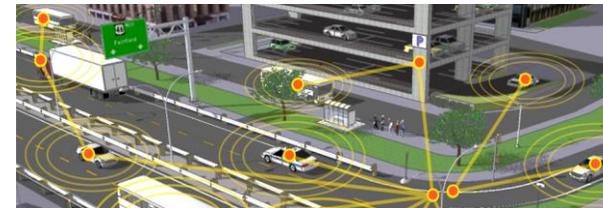
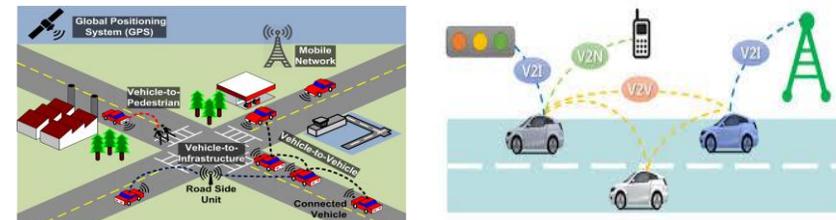
Intelligent Transport Systems (ITS) (1990s-2010s)

- Information Collection & Provision**
- Vehicle Detection System (VDS)
 - Road Surveillance & Monitoring
 - Variable Message Signs (VMS)



Cooperative ITS (C-ITS) (2020s-2040s)

- Information Collection & Provision**
- Digital Infrastructure by ICT (V2X)
 - Mobile & Nomadic Devices
 - Big Data & AI for Connected & Automated Driving



Connected Automated Driving Systems (CADS)

- Two Tracks for CADS
 - Passenger Car : High Speed & Designated Motorways
 - Level 3 being in the Market around mid-2020 by OEM
 - Public & Shared : Low Speed & Urban Mobility (e.g. UCASS in Sejong)
 - Level 4 (Driverless) being in the Market before 2020 by SME



UCASS in Sejong

Connected Automated Driving Systems (CADS)

➤ Infrastructure Requirements for CADS

✓ Physical Infrastructure

- **Vertical & Horizontal Alignment, Lanes, Pavements, etc.**

✓ Digital Infrastructure

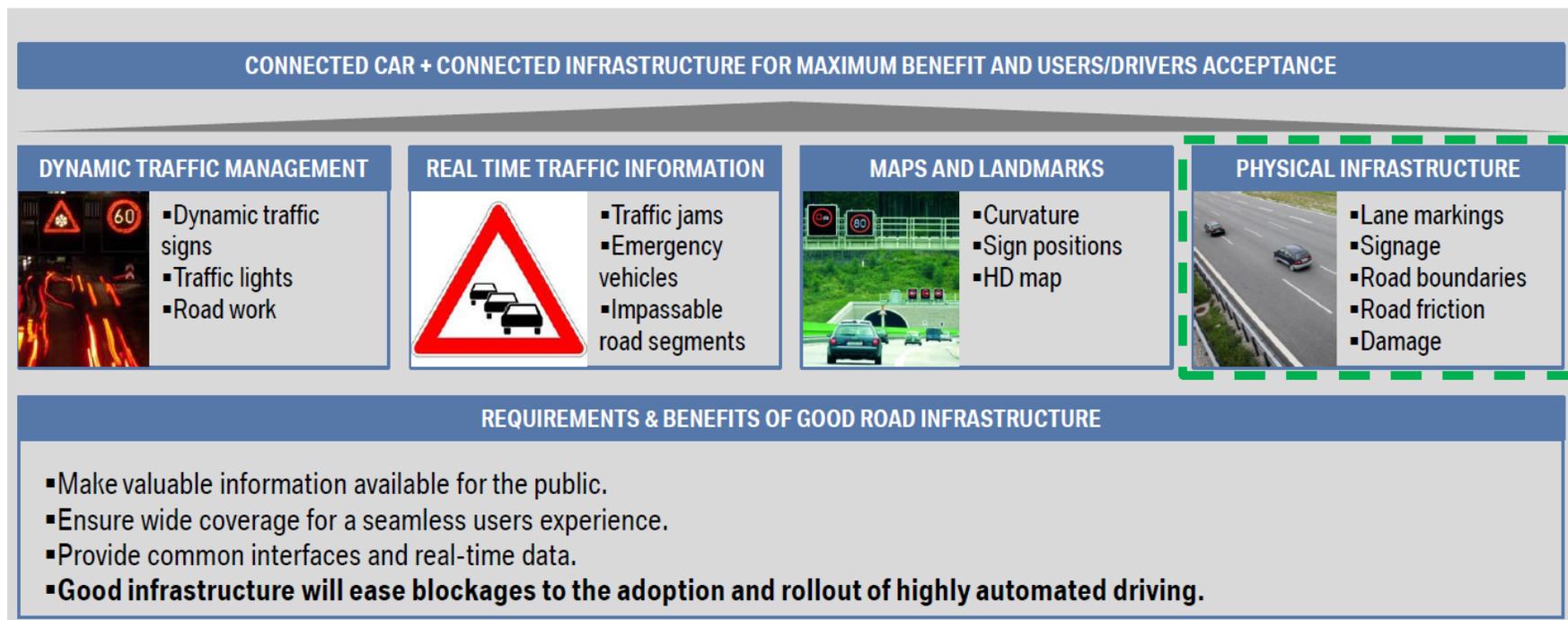
- **Digital Signages, Traffic Information, etc.**
- **V2X Communication Systems, IoT, Road Sensors, etc.**
- **HD Local Dynamic Map & Positioning, etc.**

✓ Logical Infrastructure

- **Highway Traffic Management Systems based on Big Data & AI**
 - **Double Capacity: 3,600vphpl (or 7,200vphpl ?)**
 - **Accident and Fatality Zero, Carbon Free, etc.**
- **Traffic Control and Management Systems in Urban Networks**
 - **Traffic Signal Control Systems**
 - **Mobility All Transit (e.g. Mobility as a Service, Mobility on Demand)**

Connected Automated Driving Systems (CADS)

- L3 : C-ITS Infrastructure
 - Connected Vehicle & Infrastructure: V2I & V2V



Sources : AUVSI 2014, San Francisco

Connected Automated Driving Systems (CADS)

- L4 : Automated ITS (A-ITS) Infrastructure
 - AI based Traffic Management & Control



Sources : AUVSI 2014, San Francisco

Connected Automated Driving Systems (CADS)

▪ V2X Issues for Connected & Automated Driving (CAD)

Requires new levels of connectivity and intelligence



Sources : Qualcomm, 2016

Connected Automated Driving Systems (CADS)

▪ V2X Issues for Connected & Automated Driving

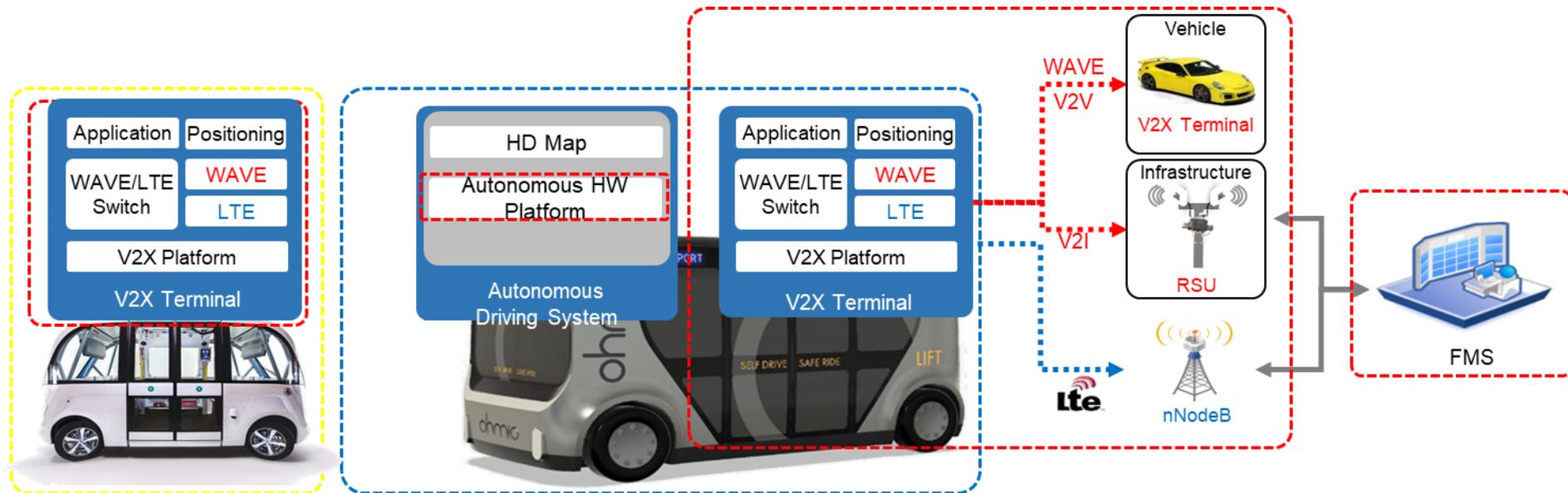


Sources : Qualcomm, 2016

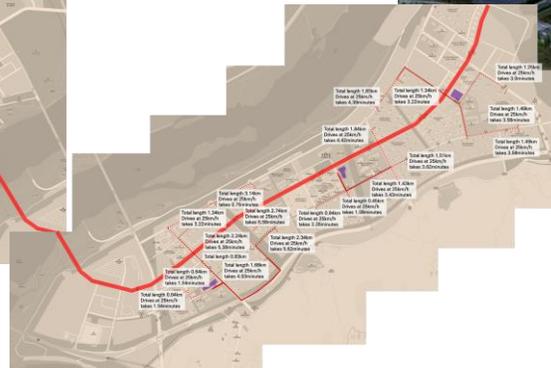
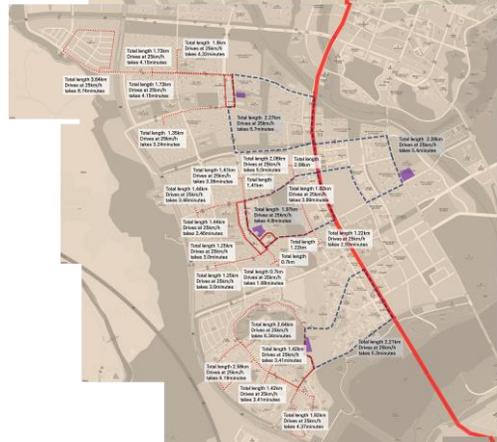
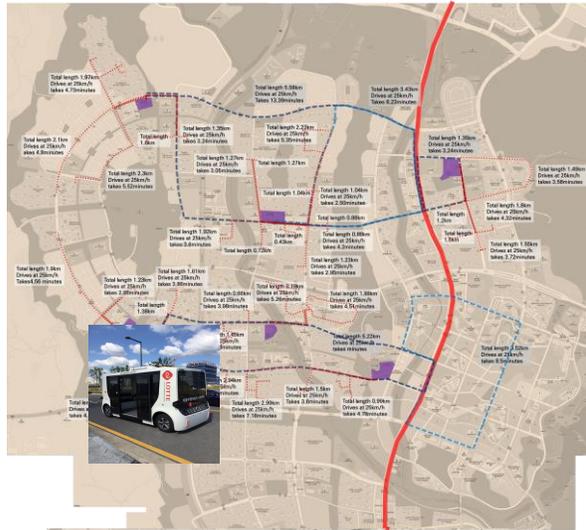
Smart Mobility in Smart City

➤ Urban Connected Automated Shuttle Systems (UCASS) in Sejong

- A User-Centric Approach to Mobility-as-a-Service
- Enabling real-time (on-demand), door-to-door, multi-modal transport services
- Bringing convenience, time & cost savings to mobility users



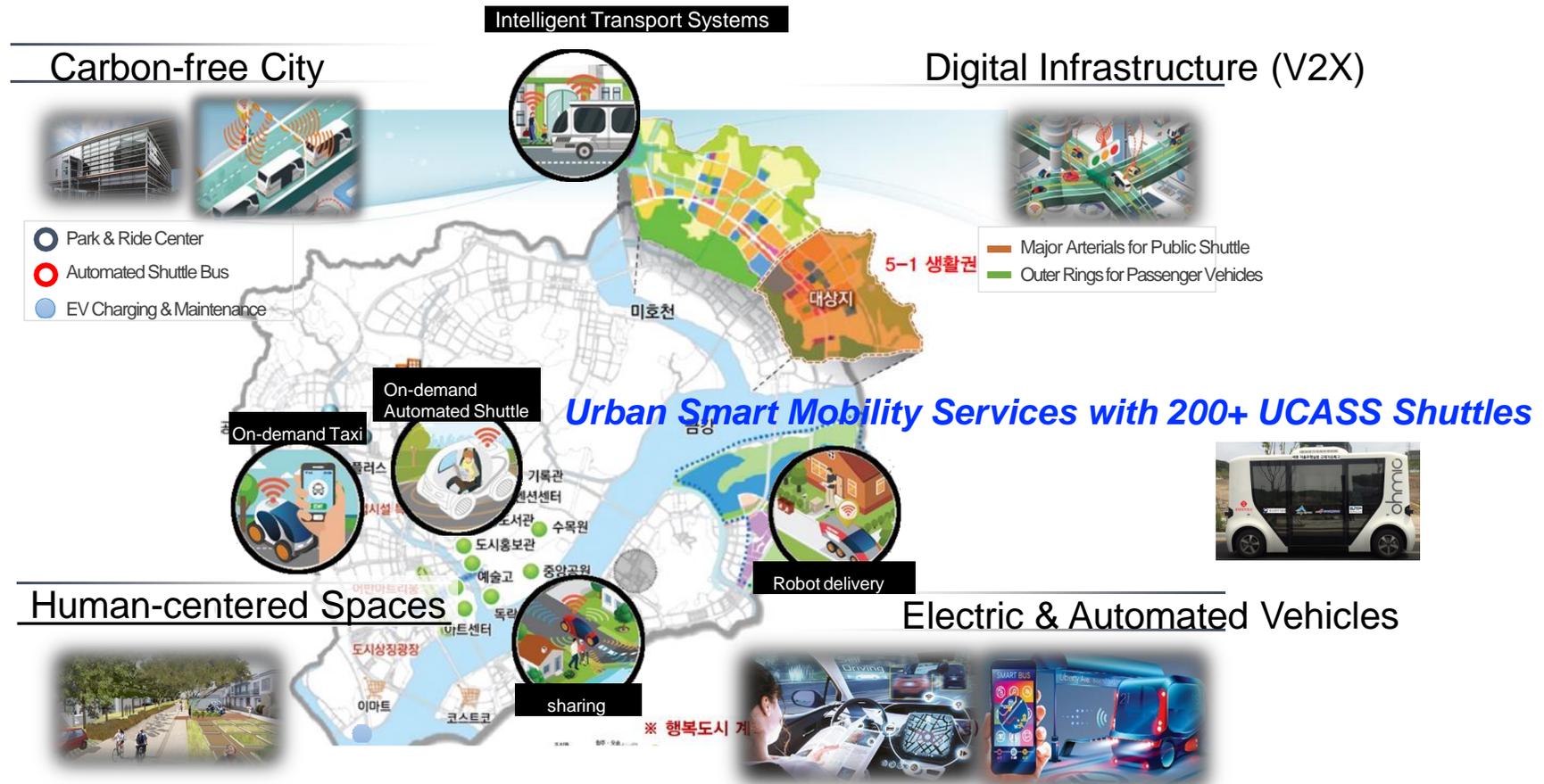
Smart Mobility in Smart City



Korean Government Complex in Sejong City, a New Capital

Smart Mobility in Smart City

➤ Urban Connected Automated Shuttle Systems (UCASS) in Sejong, Smart City



Source: The Korea Transport Institute (KOTI, 2016)

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What to be Issued?

- ◆ Infrastructure for CADS & UCASS
 - Physical, Digital, & Logical Infrastructure towards C-ITS & A-ITS
 - Big Data & AI for L3 & L4
 - Urban Traffic Management & Control System

- ◆ Digital Infrastructure for V2X by DSRC (WAVE) vs. V2X by Cellular
 - Dominated or Shared?
 - Who pays the V2X infrastructure?
 - Who pays communication charges & How much it will be?

Thank you very much!

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