Stride Towards Digitalization, Transforming the Ways We Move
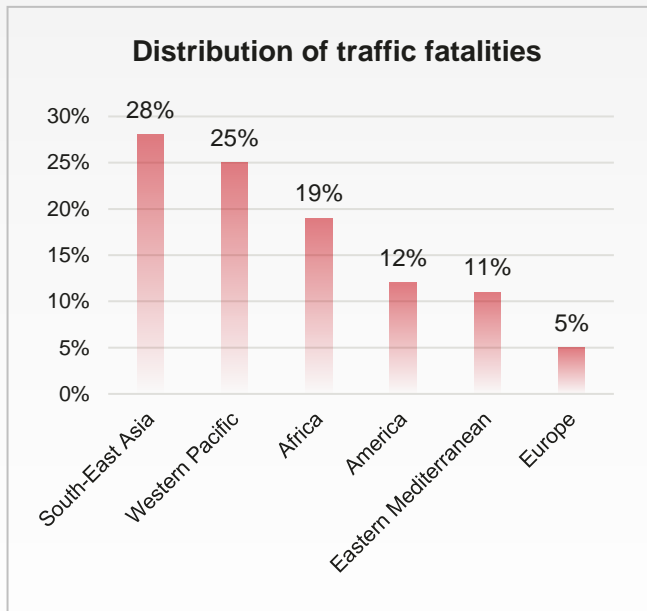
Rachad NASSAR, Ph.D.

Global Accounts Director, Smart Transportation BU

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Transportation challenges

More traffic deaths & injuries

Annual traffic deaths: 1.19 million
Annual traffic injuries: 20~50 million

Distribution of traffic fatalities

Region	Percentage
South-East Asia	28%
Western Pacific	25%
Africa	19%
America	12%
Eastern Mediterranean	11%
Europe	5%

WHO: Global Status Report on Road Safety 2023

Serious congestion

- **55% of global cities** have slow commutes during rush hours.
- Time in rush hour per year is 244~273 hours.
- The top 3 most congested city are **Paris, Saint Petersburg and London.**

Rank	City	Avg TCI	Max TCI
1	Paris	45.53	82.04
2	Saint Petersburg	40.09	88.49
3	London	38.95	70.83
4	Mexico City	37.24	80.07
5	Moscow	36.37	94.18
6	Lahore	35.57	67.47

World Urban Development Report 2022

Economic loss & Pollution

- Congestion is already costing Asian economies: **2~5% of GDP a year.**
- Transport emissions: grew at an annual average rate of **1.7%** from 1990 to 2022.

C40 Cities & IEA

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ITS: aim to achieve safe and efficient operation of road network

ITS Approaches

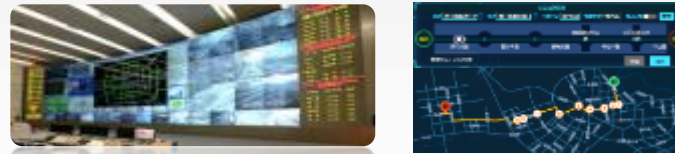| Safety | Efficiency | Experience | Sustainable |

①Order Control

- Traffic violation management
- Traffic incident management
- Traffic signal control

Basic ICT infrastructure-based (Device-Driven)

②Traffic optimization

- Traffic indicator system
- Congestion analysis
- Traffic distribution decision
- Safety analysis

- Safety governance
- Emergency dispatching
- Intelligent signal

Platform & Data-based (Data/AI-Driven)

③ Comprehensive Transportation Services

- Integrated traffic and transport management (Sea/Land/Air/Rail)
- Public Transport Services
- Transportation Hub Services
- Cargo & People Transportation Services

Collaboration-based (TOCC: Transport Operations Coordination Center)

1 Evolvable Platform

Cloud Platform   AI Platform   Converged Communications   Data Enablement   IOT

1 Expandable Network

ITS Journey in China

Pilot in some cities, started the research on the unified national standard framework of ITS	Large-scale construction of the national "Smooth Mobility Plan" and the national ITS platform	ITS is deeply integrated across multi-departments, facilitate national strategy of "Building a strong transportation country"

Total number of motor vehicles

- 400m
- 350m
- 300m
- 250m
- 200m
- 150m
- 100m
- 50m
- 10m

Annual traffic accident deaths

- 120k
- 100k
- 80k
- 60k
- 40k
- 20k
- 0

- Establishment of a National Scientific Research Institute for traffic management
- Beijing, Shanghai began to introduce traffic signal control system

- Completed and released the framework of China's ITS
- Facilities construction: 300,000 traffic signal light, large number of e-Polices & checkpoints

- 80% of cities have built traffic command center
- National unified big data resource library
- Hierarchical traffic management platform & big data application in 36 megalopolis

1985   1990   2000   2010   2020
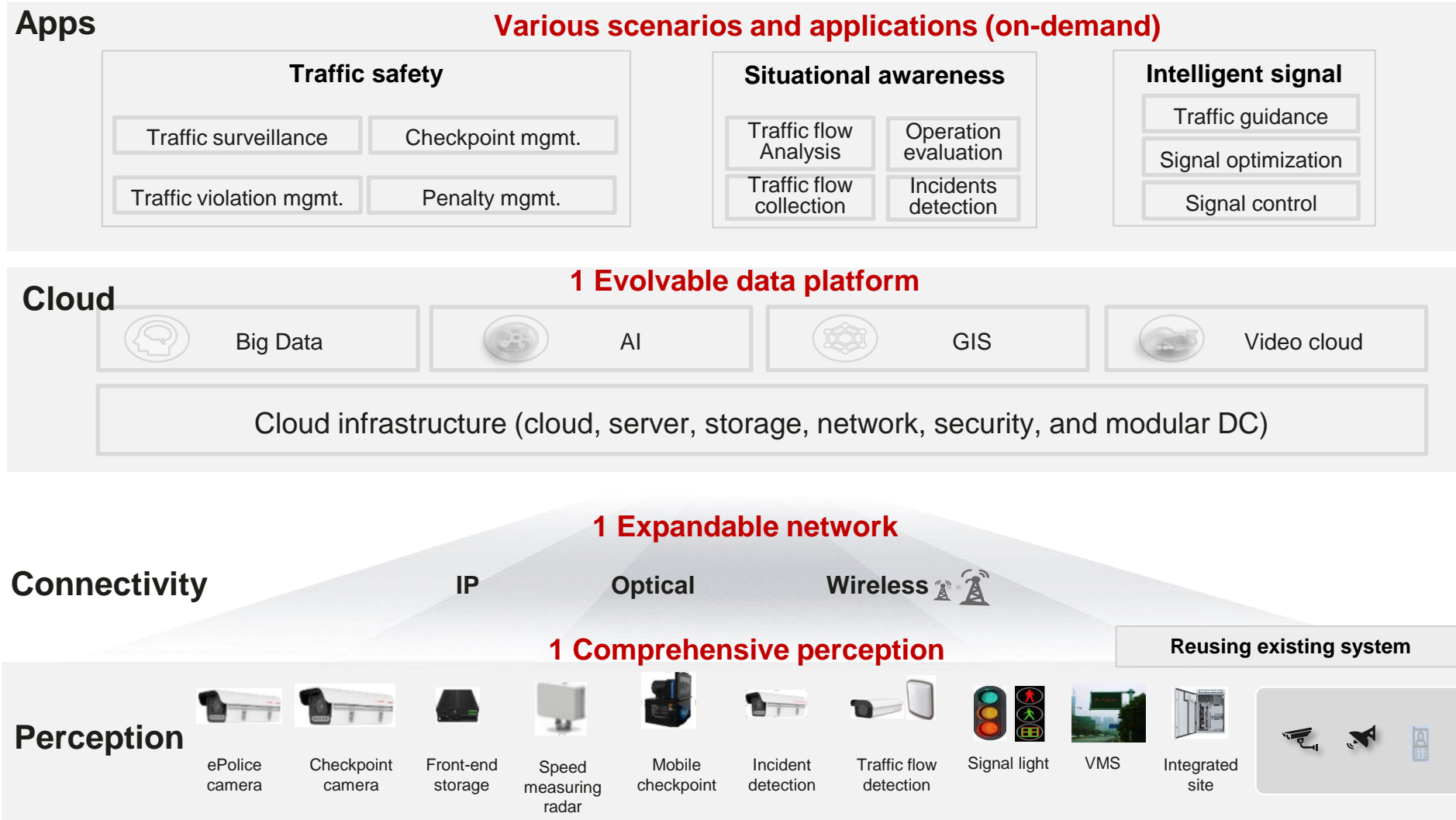
The journey of vehicle quantity from **10 million to 200 million**, China only took **23 years**.
Rely on ITS to enhance traffic management, reduced traffic accidents and deaths extremely.

Data Source: China Road Traffic Safety Forum

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Technical Architecture Overview

Apps

Various scenarios and applications (on-demand)

Technical approaches

Traffic safety

| Traffic surveillance | Checkpoint mgmt. |
| Traffic violation mgmt. | Penalty mgmt. |

Situational awareness

| Traffic flow Analysis | Operation evaluation |
| Traffic flow collection | Incidents detection |

Intelligent signal

| Traffic guidance |
| Signal optimization |
| Signal control |

Evolvable architecture

- Supporting increasing applications
- Open architecture

Cloud

1 Evolvable data platform

| Big Data | AI | GIS | Video cloud |

Cloud infrastructure (cloud, server, storage, network, security, and modular DC)

Traffic know-how platform

- Scenarios-oriented analysis
- Decision-making support

1 Expandable network

Connectivity   IP   Optical   Wireless

Cost-effective & ubiquitous network

- Mixed with IP/Optical/Wireless
- Live-network reusing

1 Comprehensive perception

Reusing existing system

Perception

| ePolice camera | Checkpoint camera | Front-end storage | Speed measuring radar | Mobile checkpoint | Incident detection | Traffic flow detection | Signal light | VMS | Integrated site |

High-precise sensing

- higher accuracy
- more types of incident perception
- Local-adapted algorithm
- Live-equipment reusing

Situation Awareness: 3 cognitions improved, identify key factors of congestion easier, and provide decision-support for traffic police

Cognition of road network
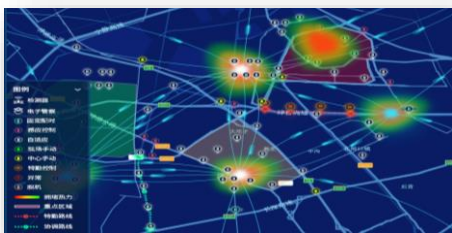
- **Causes analysis:** occasionally or frequently? Over road capacity or other controllable reasons?
- **Road network:** mismatch between upstream and downstream traffic, mismatch between entrance and exit, etc.
- **Management:** mismatch between signal control and traffic flow, or between lane configuration and travel requirements, etc.

Cognition of travel patterns
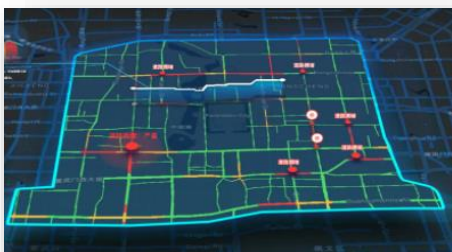
- **Full statistics:** travel vehicles by day, by time period, local & outside vehicles, etc.
- **Travel characteristics:** frequently travel vehicles, OD analysis
- **Key target identification:** mileage & areas of different types of vehicles

Cognition of traffic patterns

- **Traffic analysis:** traffic flow composition, key route identification, OD analysis
- **Correlation analysis**: how vehicle affects road conditions, correlation between active vehicles and congestion levels

Figure out TOP congested roads, identify key causes

731   1448

Zhongshan Road

Zhuangyuan Road   Jincheng Road
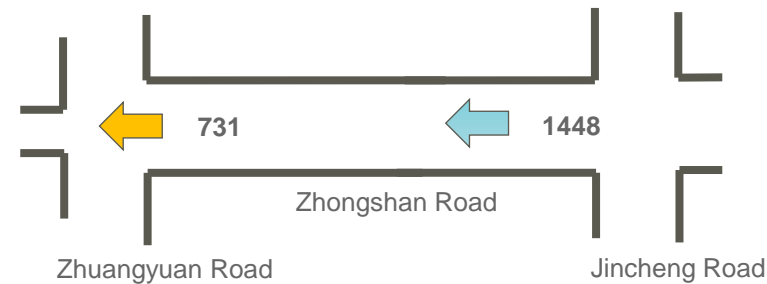
Mismatch of upstream and downstream traffic flow: 1,448 PCU/h vs 731 PCU/h
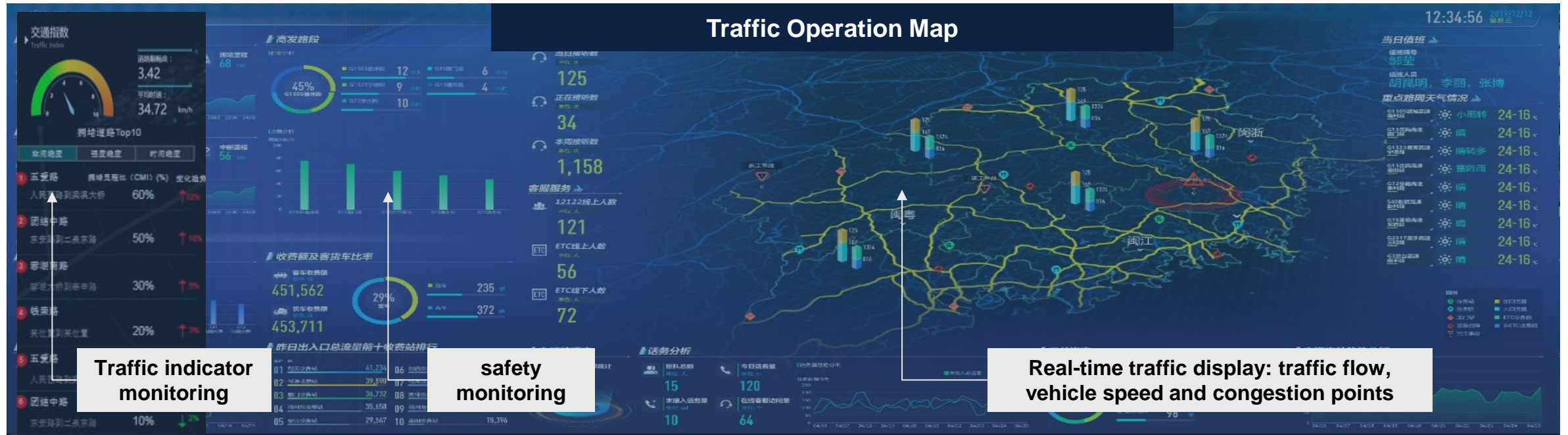
Precise traffic guidance

Public APP

Holiday travel guidance

As usual data, 46,000 vehicles will travel outside on holiday from one road.
APP send off-peak suggestions in advance, and 14,000 vehicles follow the suggestions of traffic police.
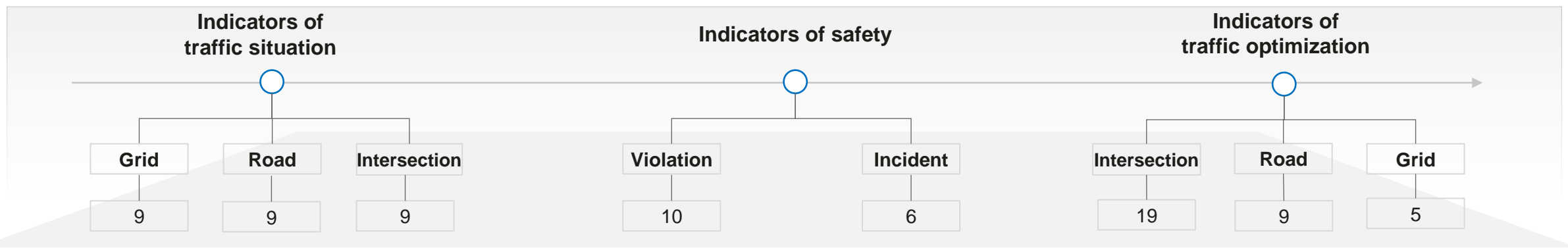
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A completed traffic evaluation indicators to support closed-loop governance

Traffic Operation Map

Traffic indicator monitoring

safety monitoring

Real-time traffic display: traffic flow, vehicle speed and congestion points

Indicators of traffic situation

Indicators of safety

Indicators of traffic optimization

Grid	Road	Intersection		Violation	Incident		Intersection	Road	Grid
9	9	9		10	6		19	9	5

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Intelligent Signal Control: multi-vendor interconnection and green wave

Capability
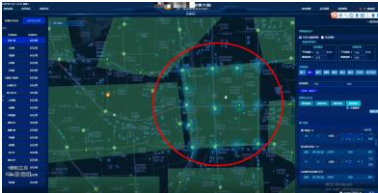
Single Intersection Intelligent Signal Control

Dynamic Green Wave

Sub-Area Coordination

Solution

Unified and intelligent signal control network platform

Vendor A   Vendor B

Off-peak hour

Intelligent
Edge computing

Rush hour

Precise traffic awareness :
Radar-Vision All-in-One

Traffic Sensing

- All weather + Day & Night
- High-precise

Intelligent Signal Control

- 10,000+ intersections and 20+ years of successful experience
- Highly reliable, stable, and efficient algorithm,

Unified Control

- Compatible with more than 40+ brands such as SCATS / SCOOTS

Benefits

↓ **30%**

Travel Time

↓ **40%**

Number of stops

↑ **25%**

Average speed

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Huawei has served Roads transportation industry more than 20 years

Huawei has served around Asia, Africa, Latin-America, Europe and Middle-east regions, which aim to achieve "Easy Driving, Smooth Mobility, Convenient Logistics with cutting-edge technologies".

France Italy Serbia Tadzhikistan

China

Mexico

Saudi

Nigeria

Surinam

Cote d'Ivoire Ethiopian Pakistan

Uganda UAE

Ghana

Kenya

South Africa

Dedicated BU

Getting deep inside urban transportation scenarios, look for most suitable technologies to truly empower traditional industry with digitalization

Global R&D Innovation Platform

9 Regional innovation center

7 Open Lab

Local training center

Thank you.

把数字世界带入每个人、每个家庭、每个组织，构建万物互联的智能世界。

Bring digital to every person, home and organization for a fully connected, intelligent world.