

# Transforming the Ways We Move

Building a Safe, Orderly, and Smooth Traffic Environment



**1 Trends and challenges**

**2 Solution Introduction**

**3 Successful Case**

# Business Challenges: Rapid Urbanization Brings More People and Vehicles to Roads, Intensifying Traffic Pressure

Cities are facing challenges

## Maintaining road safety

- Deaths: **1.35** million
- Injuries: **50** million
- Economic loss: US\$**500** billion
- Complex urban road networks
- Insufficient police resources

The number of people and cars is growing

## Road construction is not keeping pace

- Vehicle and driver numbers are rapidly increasing
- **50%** of traffic congestion is caused by uncivilized driving behavior

The public is asking for a better travel experience

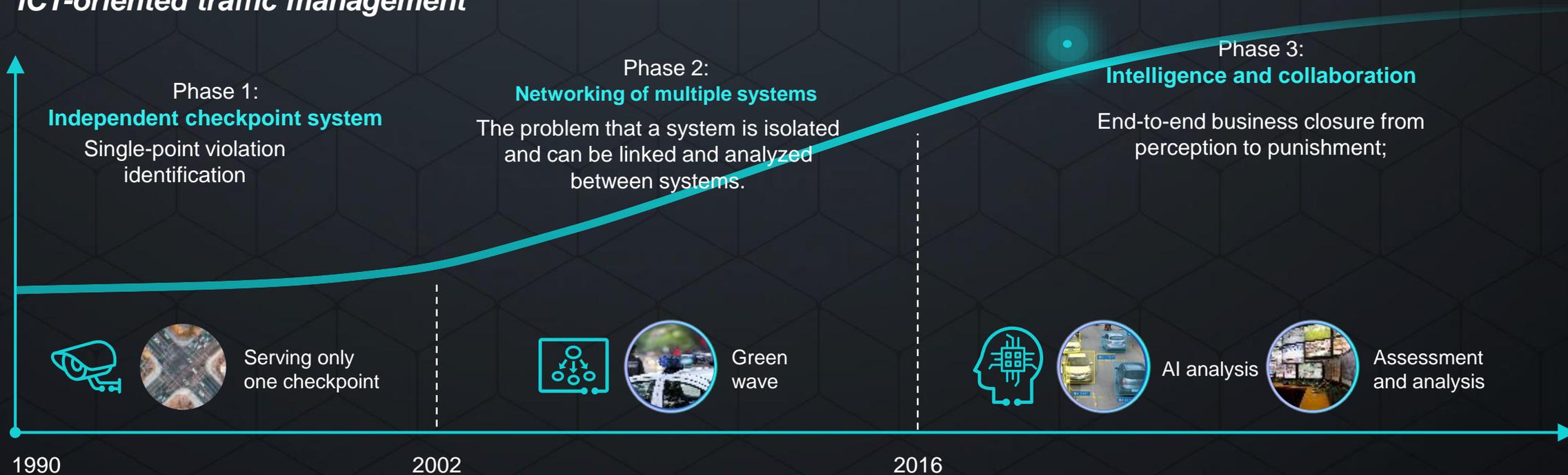
## Demand is growing

- A better travel experience
- Rapid response to major events

Source: the World Health Organization

# Constructing and developing ITS is an effective means to solve the above challenges

## ICT-oriented traffic management



The intelligent era has arrived, with AI as its foundation.

Big data platforms support service applications.

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# Intelligent Traffic System Concept



1

## Eye : Smart sensing

- All targets and objects
- All weather and always-on

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2

## Brain: In-depth insights

- Real-time analysis and warning
- Comprehensive assessment and action

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3

## Hand : Smart Response

- Intelligence for command and decision-making
- Integrated command and control

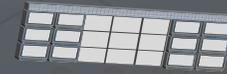
# Intelligent Traffic Solution (ITS)

## Integration to Legacy System

SMS gateway

Penalty Collection

Vehicle and driver management system



Command & Control

## Traffic law enforcement

Violation handling



Penalty processing



## Vehicle check and control

Checkpoint management



Vehicle big data



## Traffic control

Signal control



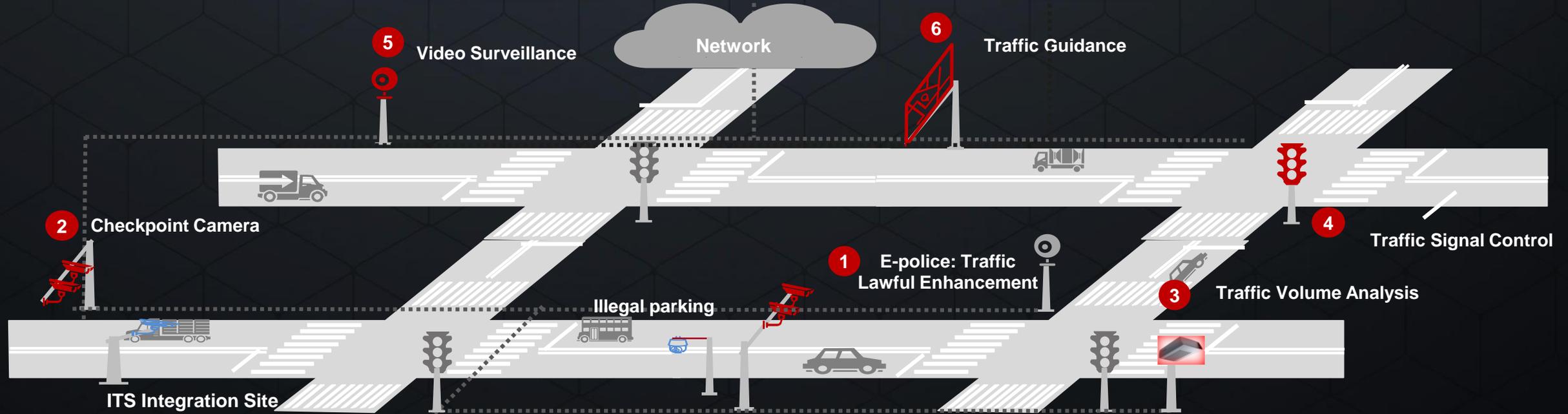
Traffic detection



Information release



7 ITS Platform



# 1. e-Police : AI based traffic lawful enhancement

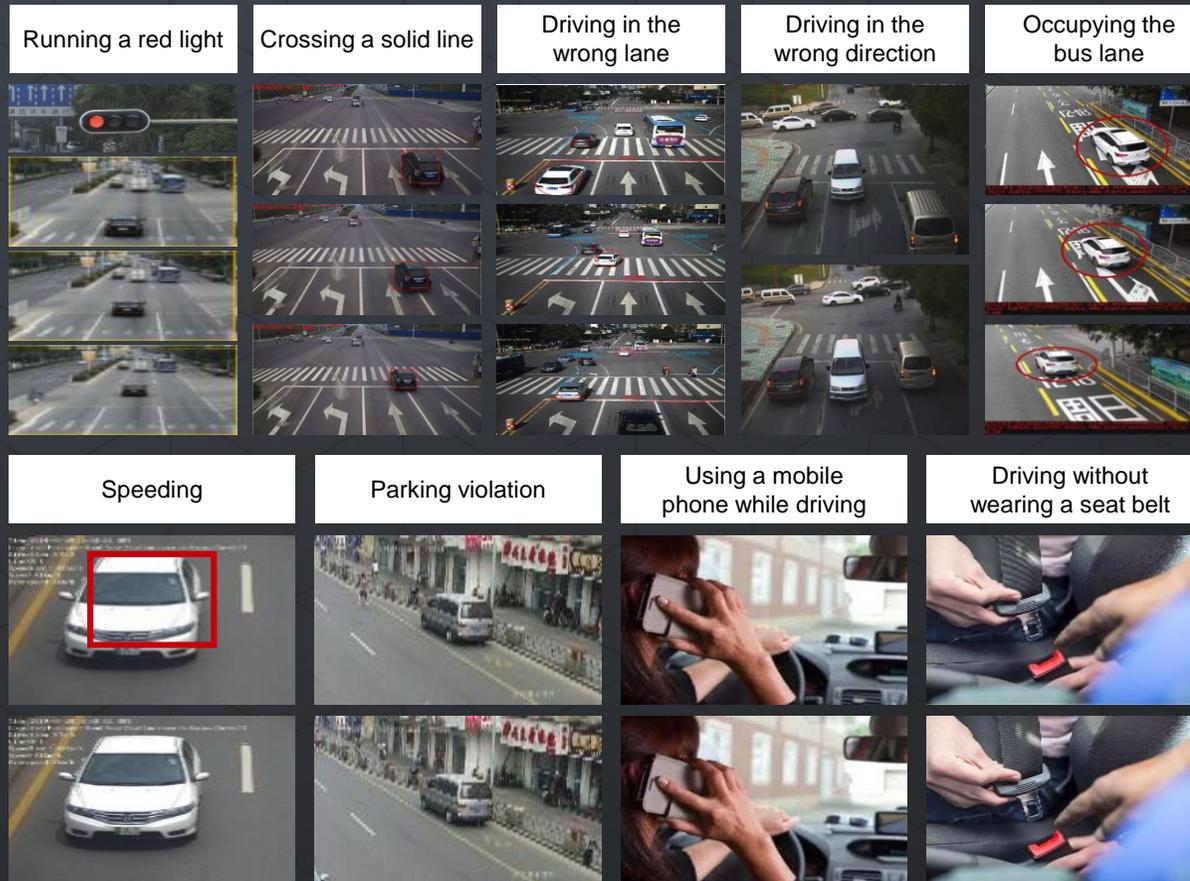
Single violation



Running a red light

Intelligence

## Various traffic violations

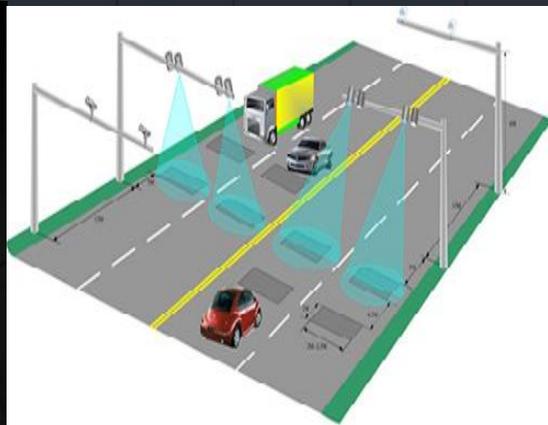


## 2. Checkpoint: perception-less inspection & tracing

Plate number detection



Speeding detection



Inspection & dispatching



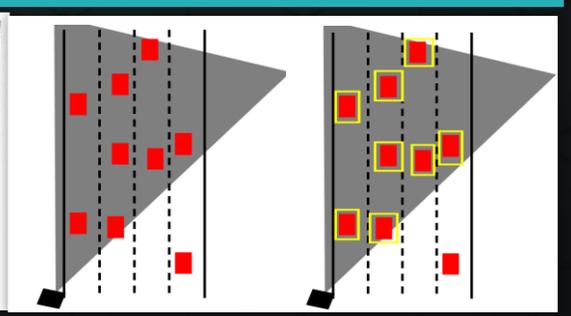
Trajectory tracking



Integrated design, flexible installation



Mobile checkpoint installation-roadside installation



High-definition, intelligent, 24-hour capturing

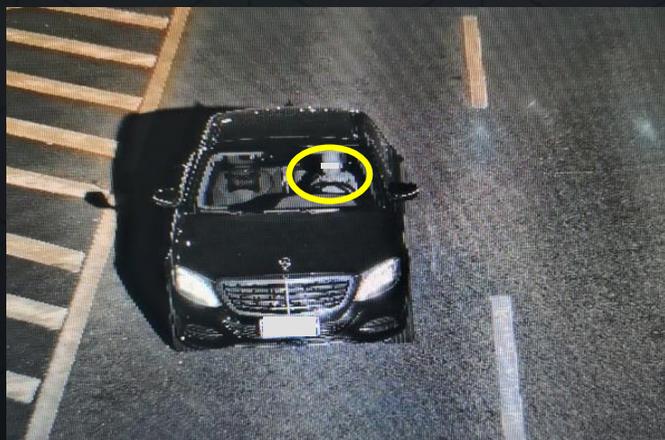
Automatic recognition and tracking for black-list, escaping and suspect vehicles; to improve the response speed of traffic management

# SuperColor : Scene Adaptation, Full-Color Video and Images, No Light Pollution

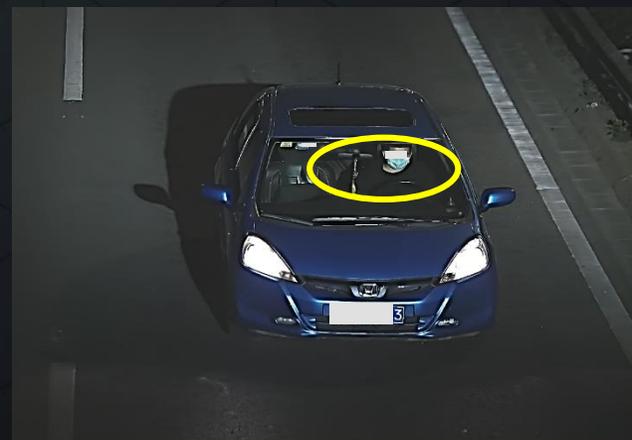
Traditional ITS camera: complaint for flash light



Huawei AI-powered low-light camera: driver-friendly, no flash light

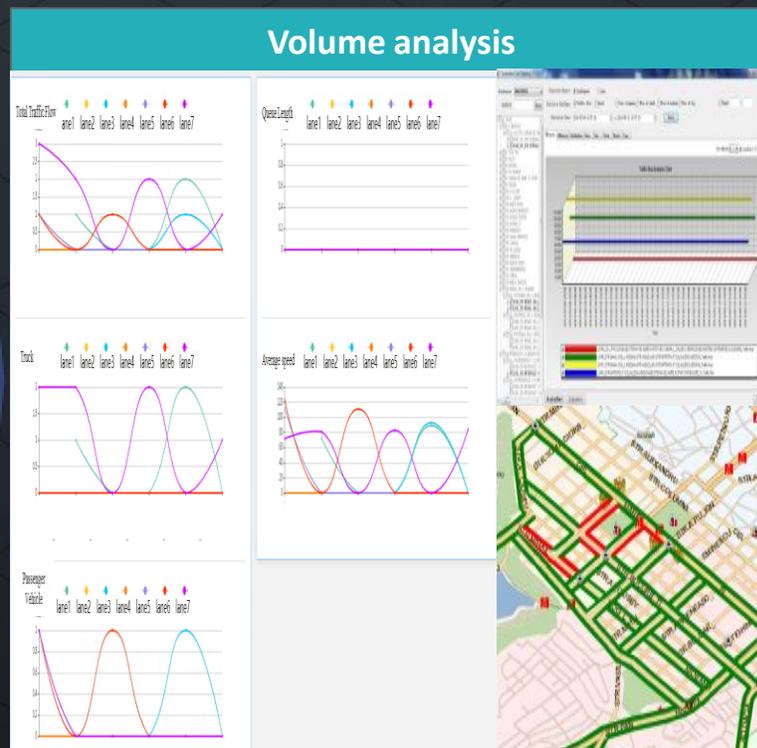


Multi-spectral image synthesis: color cast, visible light + white strobe



AI-powered image augmentation: natural color without cast

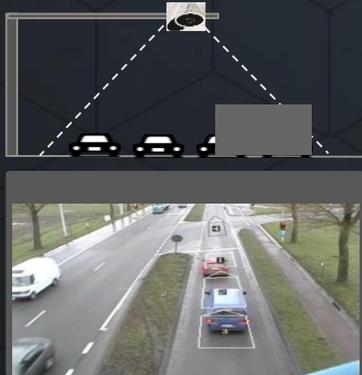
# 3. Traffic Volume Collection



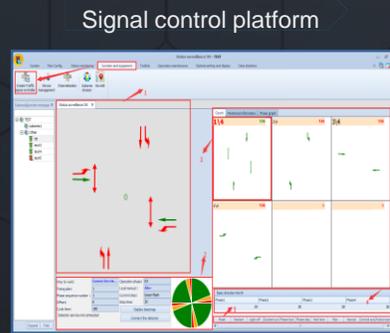
Precise statistics, straightforward display and smart linkage of vehicle flow provide reference for urban traffic planning, signal control and public travel

# Software Defined Camera Enable Traffic Signal Light to Aware Traffic

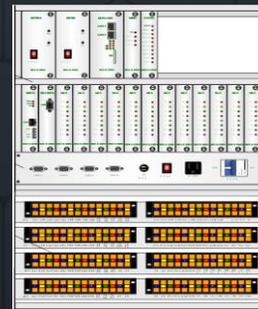
Video volume Detection



Signal control: Traffic Coordination at Junctions



Signal controller



Traffic light

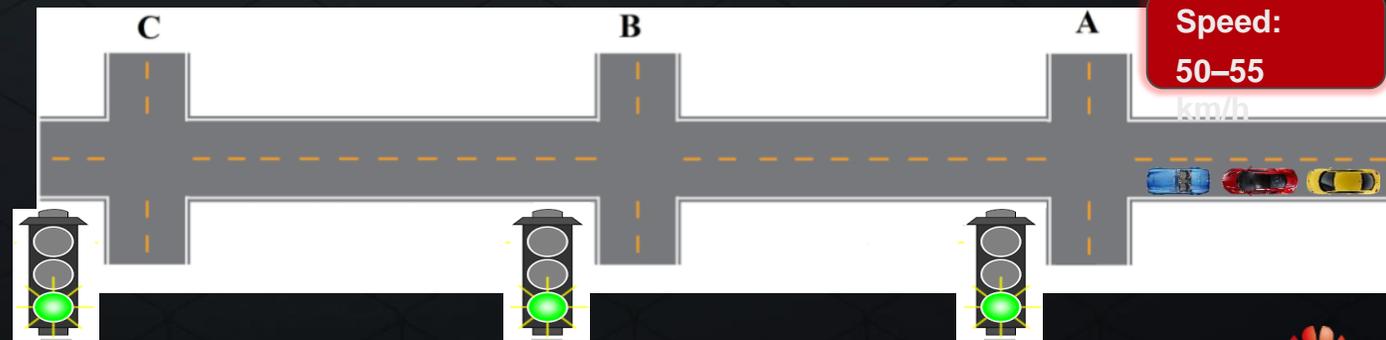
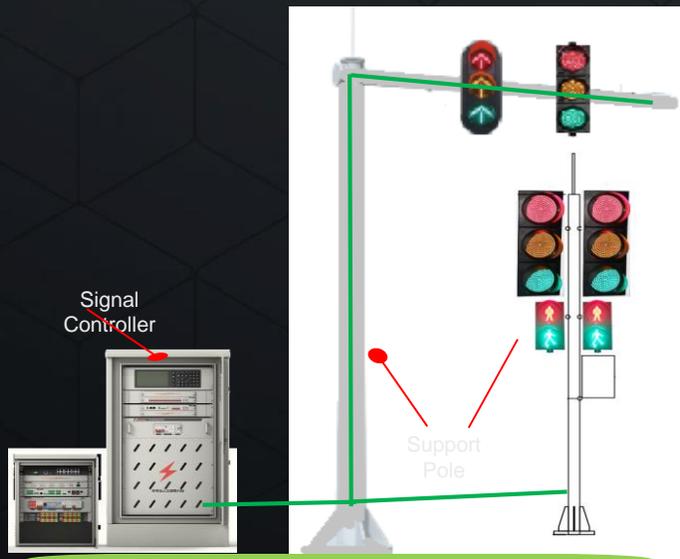


Features

- Single-checkpoint control
- Trucking-based control
- Regional coordination, optimization, and control
- Manual control
- Bus-priority control
- Special service control

## Functions: Green Wave Band

Certain period and offset for signal control are configured at a line of junctions to provide all-green lights throughout the road. This enhances the overall average speed and travel capacity



# 4. Video Surveillance : SDC Detect Traffic Incident by AI

## Traffic Incident Detection Application

Traffic Congestion

Traffic Accident

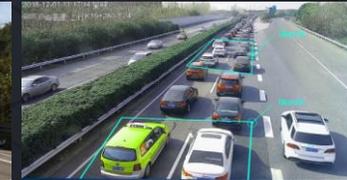
Driving in Opposite Direction

Littering

Fire Detection

Traffic Conditions

Visibility Detection



### Detection Algorithm

SDC Checkpoint



AI Low Light Checkpoint



Dual lens AI PTZ



### GIS



### Video Analytic



VMS IVS 3800

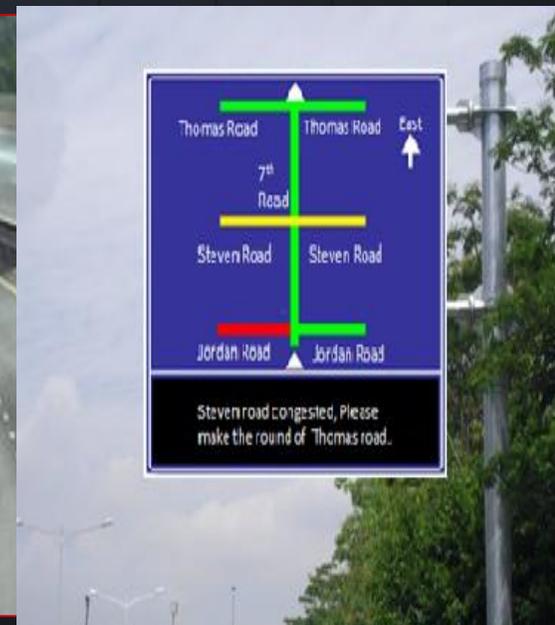
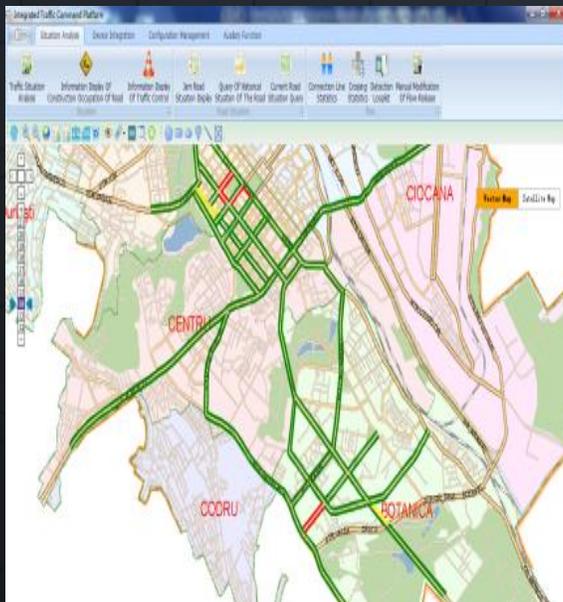
# 5. Traffic Guidance

Real-time traffic conditions

Incidents & construction information

Road closure information

Convenient service for route choosing



Real-time and eye-catching traffic guidance with centralized control

To effectively divert and reasonably balance traffic flow; to facilitate the optimization of travel route

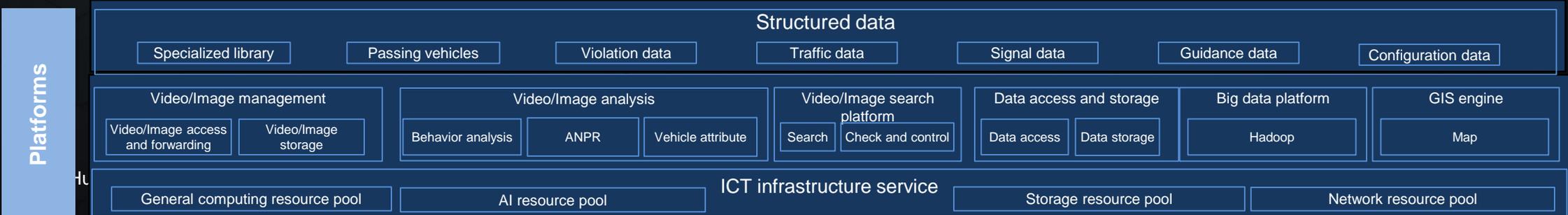
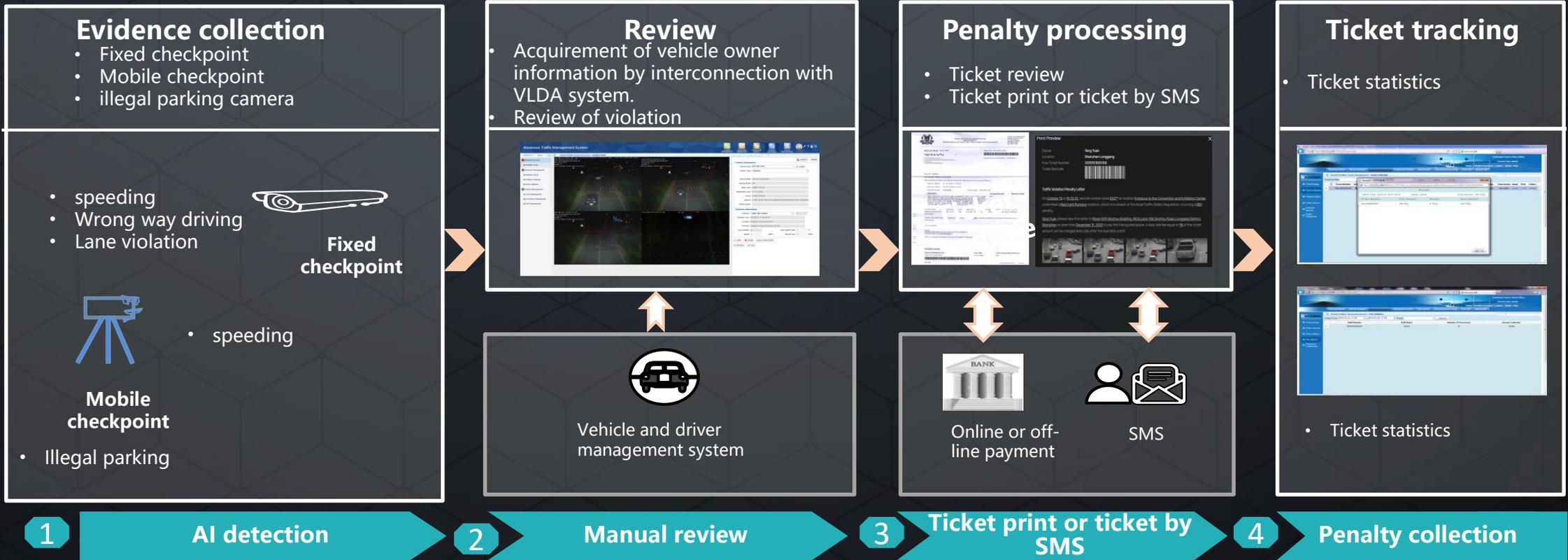
## 6. ITS Platform: One Stop Command & Control



**Integrated, centralized and open traffic management with visualized interface**

Break isolated information island with data gathering, mining and processing; realize multi-department collaboration and complete data sharing

# AI & Big Data make Life Easy: E2E for case detection, evidence collection, approve and punishment



# Advanced Technology Enable ITS Benefits

## Society Benefits

### Improve Efficiency

Traffic efficiency  30%

Traffic delays  20%

Traffic Accidents  60%

Police onsite handling  50%

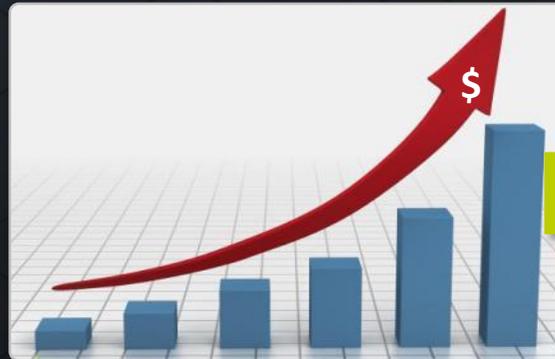
unhealthy driving habit  90%

### Reduce Vehicle Emission

Fuel Costing  27%

Carbon about  8%

Particulate Matter  6%



## Economic Benefits

According Industry Opinion, Every Junction was recorded more than **50 Violations** Per Day;

**200 Junctions** will be built;

Average **10,000 Violation** will be recorded Per Day;

Average **3,650,000** Records Per Year;

Average Fine **50 USD** Per Record;

**182.5M USD** Financial Revenue Per Year;

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# Based on ITS, Cote realizes rapid analysis and handling of traffic flow statistics and overspeed behavior



## Background

- Many road accidents and deaths, and huge economic losses
- There are **over 12,000 personal traffic accidents** in Côte d'Ivoire every year, mainly caused by speeding. These result in an average of **1200 deaths and 21,000 injuries** as well as economic losses amounting to about **3%** of the nation's GDP.

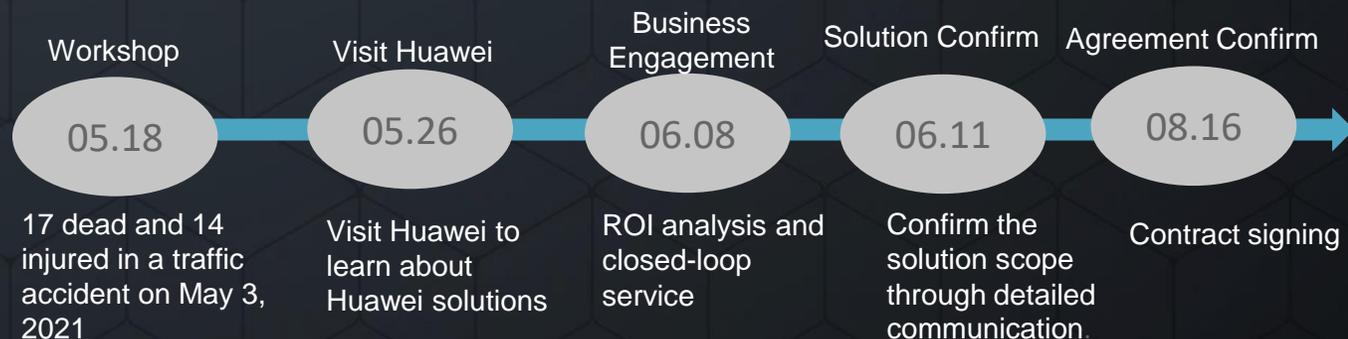
The Minister of Transport of Côte d'Ivoire said that the country has a long way to go for road safety management.

## Service Analysis

The project covers **1100 km** of roads.



### Key actions



- Operation mode: Violation fines support project construction
- Fund sources: Local financing
- ROI analysis: The investment can be recovered based on the five-year penalty.

Location (Toll - 9)	Toll distance	Checkpoint quantity	Vehicle quantity per region	Traffic flow increment/year	Violation rate	Fine amount per violation (EUR)
Abidjan-Abidjan	28	4	143,837	1%	2000	
Abidjan-Cocody	24	2	137,282	1%	2000	
Abidjan-Tremoulayes	37	16	76,489	1%	2000	
Abidjan-Cote	12	2	72,443	1%	2000	
Abidjan - Bouaké - Sassandra - Daloa - Yamoussoukro	21	2	72,443	1%	2000	
Abidjan - Bouaké	23	2	58,217	1%	2000	
Abidjan - Yamoussoukro	20	2	42,219	1%	2000	
Abidjan - Yamoussoukro	20	2	42,219	1%	2000	

1. Revenue Input Items	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	In total	Remark
Vehicle quantity per month with TOLL	149,667	151,171	152,700	154,251	155,823	157,415	159,027	1,033,954	And suppose that traffic flow increases by 5% every year.
Vehicle quantity per month with TOLL	113,088	118,742	124,479	130,193	137,059	144,032	151,249	811,849	
Vehicle quantity per month with TOLL	76,489	80,313	84,209	88,143	92,117	97,231	102,502	530,504	
Vehicle quantity per month with TOLL	76,489	80,313	84,209	88,143	92,117	97,231	102,502	530,504	
Vehicle quantity per month with TOLL	88,271	91,004	93,555	96,534	100,332	105,149	110,016	594,862	
Vehicle quantity per month with TOLL	88,271	91,004	93,555	96,534	100,332	105,149	110,016	594,862	
Vehicle quantity per month with TOLL	62,434	65,556	68,834	72,273	75,889	79,684	83,658	450,272	
Vehicle quantity per month with TOLL	38,197	40,107	42,133	44,278	46,545	48,937	51,466	281,703	
Violation rate among all passing vehicles	6.0%	3.6%	3.0%	2.4%	1.8%	1.5%	1.5%	3.0%	There is no statistics data and supposed to be 6% tentatively in the first year. For reference, it is usually 3% in China.
Violations (speeding, driving on solid lines, wrong way driving) shall be punished	1	1	1	1	1	1	1	7	Here it is supposed that one violation (speeding) shall be punished.
Fine amount per violation (EUR)	2000	2000	2000	2000	2000	2000	2000	14000	Suppose the fine amount keeps unchanged with 2000EUR per violation.
Revenue per year for all sites (EUR=656)	8,944,894	11,270,566	16,436,243	13,806,444	10,872,975	11,416,203	11,987,013	84,733,938	Subtotal revenue EUR

2. OPEX Items	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	In total
Maintenance fee	-	-	-	-	3,300,000	3,300,000	3,300,000	9,900,000
Operation fee	1,000,000	2,000,000	2,400,000	2,400,000	2,400,000	2,400,000	2,400,000	14,000,000
Subtotal OPEX (EUR) for all sites	1,000,000	2,000,000	2,400,000	2,400,000	5,700,000	5,700,000	5,700,000	24,900,000

3. Net profits (EUR) per year	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	Total sum profits
8,944,894	9,270,566	14,036,243	11,406,444	5,172,975	5,716,203	6,287,013	6,287,013	59,833,938

4. Accumulated amount (EUR) per year	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	Total sum profits
7,944,894	17,211,160	31,247,403	42,653,847	47,830,722	53,546,925	59,833,938	66,620,951	426,933,938

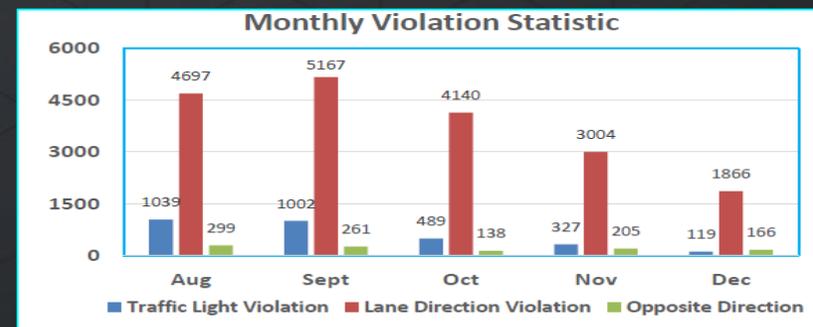
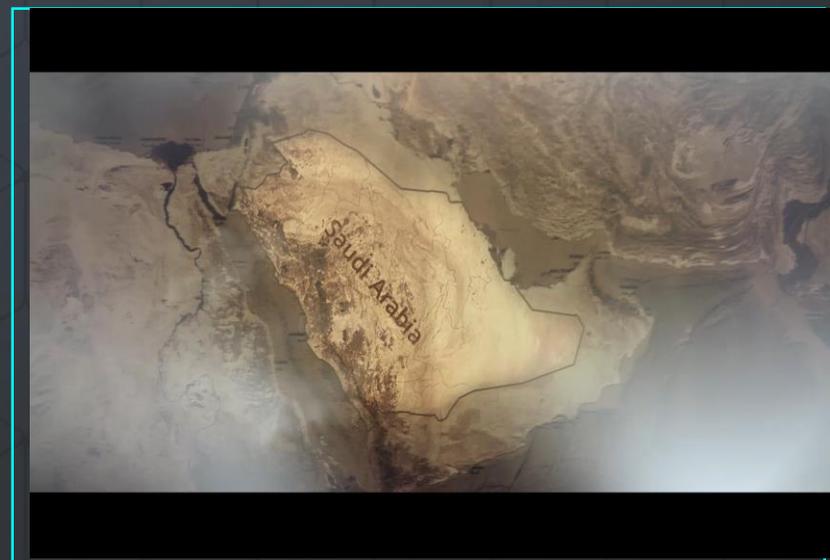
**Input: calculation assumptions**

- **Vehicle flow**: suppose that traffic flow increases by 5% every year.
- **Violations** include speeding, driving on solid lines and wrong way driving. Here, suppose that one violation (speeding) shall be punished.
- **Violation rate**: there is no statistics data and supposed to be 6% tentatively. For reference, it is usually 1% in China.
- **Reference case**: death rate of traffic accidents per 10,000 vehicles decreased 20% between 2017 and 2019 in Shenzhen city. Here, it is expected that the rate decreases by 40%-50% within 3 years.



# Yanbu, Saudi Arabia: Traffic Law Enforcement System Provides a Safe and Efficient Traffic Environment

- e-Police: **16** intersections
- Traffic surveillance: **256** sets
- AI algorithms identify and take snapshots of traffic violations such as running red lights, lane infringement, driving in the wrong direction, and ignoring lane directions.
- Retrieval based on the license plate or vehicle characteristics (such as color and brand). Through real-time analysis, check, and control, the system enables users to track the vehicle and detain offenders.



# Lahore, Pakistan: Intelligent e-Police Relieves Traffic Congestion

Lahore built its intelligent e-Police in 2016

270+ ANPR cameras at 80+ road checkpoints,  
990+ e-Police, 300 traffic flow cameras, 130+ sets of traffic  
light sites.



60+ million violations recorded since deployment  
(2017.01–2018.10)  
130,000+ e-tickets issued within the first two  
months  
Running red lights: Reduced by **66%**  
Traffic accidents: Reduced by **83%**



## Vision and Mission

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