TraffiClair

ClairWav Presentation

Microwave Radar Family

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Confidential

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2. Key Features & Core Values
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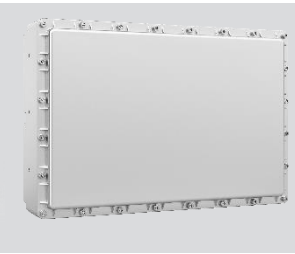
ClairWav Microwave Radar Family

T24L	T24S	T24LC	T24SC	T24-700	T24-700C	T80L	T80LC	U24
24GHz	24GHz	24GHz	24GHz	24GHz	24GHz	80GHz	80GHz	24GHz
Traffic Control	**Traffic Control**	**Traffic Control**	**Traffic Control**	**Traffic Control**	**Traffic Control**	**Traffic Control**	**Traffic Control**	**Tunnel**
								
Vehicle detection distance up to 400m	Vehicle detection distance up to 250m	Vehicle detection distance up to 400m, **integrated with an 8M video camera**	Vehicle detection distance up to 250m, **integrated with an 8M video camera**	Vehicle detection distance up to 700m	Vehicle detection distance up to 700m, **integrated with an 8M video camera**	Vehicle detection distance up to 350m	Vehicle detection distance up to 350m, **integrated with an 8M video camera**	Vehicle detection distance up to 400m
12 lanes 256 targets 64 bars	12 lanes 128 targets 64 bars	12 lanes 256 targets 64 bars	12 lanes 128 targets 64 bars	14 lanes 512 targets 64 bars	14 lanes 512 targets 64 bars	8 lanes 256 targets 64 bars	8 lanes 256 targets 64 bars	2 lanes 128 targets 64 bars

Radar Application Scenarios



City Intersections

ClairWav-T24/T80/T24-700



Highway

ClairWav-T24/T80/T24-700



Tunnel

ClairWav-T24/T80/T24-700

Radar Frequency Options

24GHz	80GHz	94GHz
• Traffic Control: T24, T24-700 • Tunnel Management: U24	• Traffic Control T80	• Traffic Control T94
• Traditionally used globally for traffic monitoring but is now being phased out due to performance and regulatory shifts	• Widely adopted for high-performance roadside traffic detection, especially in China and Europe, though its use faces regulatory restrictions in some regions like the US	• A new, dedicated frequency band for roadside traffic radar in China, promoted for its high resolution and to avoid interference with vehicle radars
		

Detection Range



T24S, T24SC 250m



T80L, T80LC 350m



T24L, T24LC, U24 400m



T24-700, T24-700C 700m



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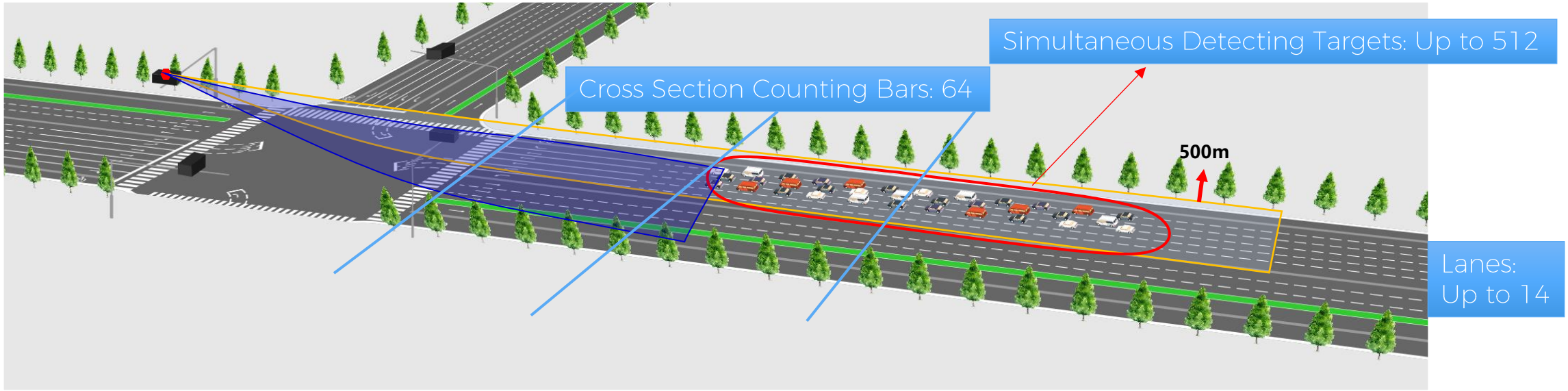
Lanes, Targets, Cross Section Bars



	T24L	T24S	T24LC	T24SC	T24-700	T24-700C	T80L	T80LC	U24
Lanes	12	12	12	12	14	14	8	8	2
Targets	256	128	256	128	512	512	256	256	128
Bars	64	64	64	64	64	64	64	64	64

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ClairWav Key Features

Wide-Area Real-Time Acquisition

Long-Range Sensing

250-400m (820-1320ft) Ultra-Long Monitoring Distance

Multi-target Monitoring

Simultaneously monitoring up to 12 lanes, 256 vehicles

High-precision Holographic Data

High-precision Data

Holographic Data Monitoring: Vehicle Distance, Heading, Speed, Acceleration

All-weather Operation

Adverse Weather, Darkness, Intense Light, Hail, Rain and Snow

Rugged Performance

Stable Application

Independent IP. Customization design available. 24GHz, Anti-interference.

Maintenance-free

Non-intrusive installation. Easy Installation with 10-year MTBF.



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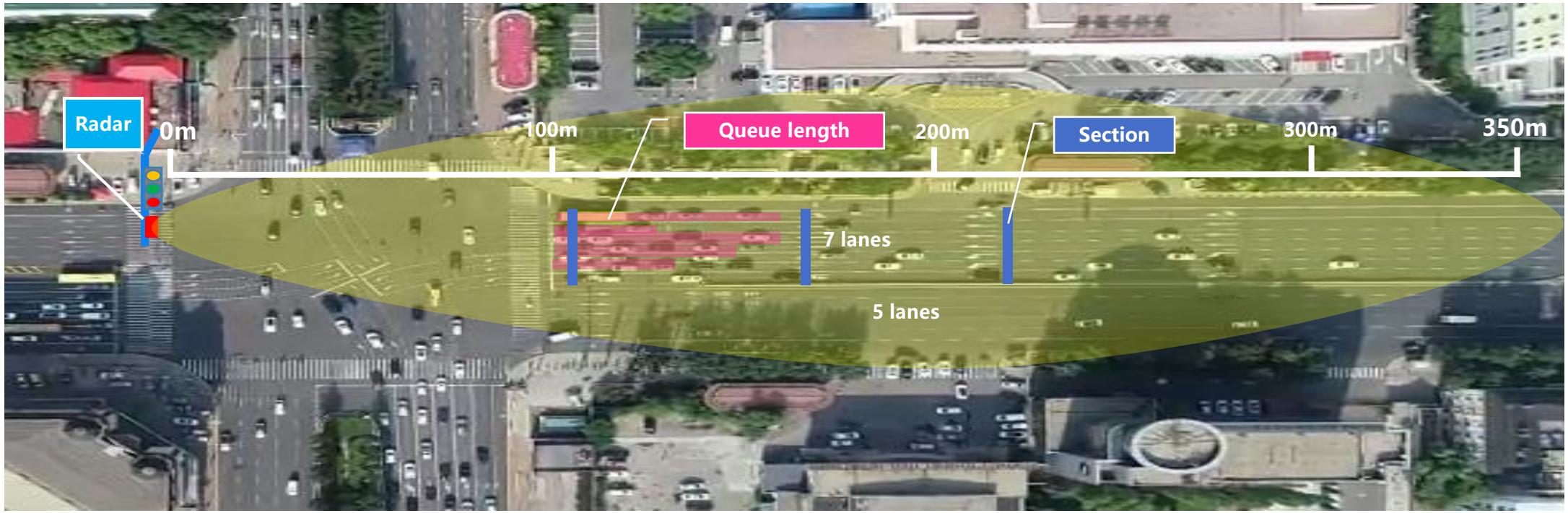
ClairWav Core Values



All-weather high reliability

The radar can operate normally in any weather and lighting conditions, with a lifespan of 5 to 10 years.

Wide-range monitoring

The radar can simultaneously monitor ≥12 lanes at a maximum distance of ≥350m.

Real-time accurate data

Scans and detects vehicles within the detection range at a speed of 10 to 20 times per second, providing various information such as traffic volume, queue length, average speed, and vehicle classification, with an accuracy rate of over 90%.

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AI Real-time Traffic Signal Optimization System

√ AI Signal Timing **√ Real-time Control** **√ Regional Coordination**

Dynamic Traffic Data Monitoring

Vehicle Passage Data
Traffic flow, speed, and queue length,

Road Operational Efficiency

Road condition assessment
- Evaluate road conditions
- Assess optimal phase settings and the limit of traffic efficiency
- Predict locations of road congestion

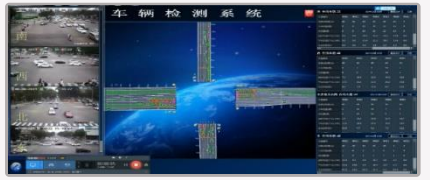
Intersection operational status monitoring

Traffic Incident Detection and Reporting

Single Point Analysis
- Single Intersection Control
  - Single Intersection Adaptive Control
  - Reverse Overflow Control
- Comprehensive Control of Multiple Intersections
  - Multi-Intersection Green Wave Control
  - Regional Traffic Flow Control

Regional Analysis
- Route Control
- Manual Control
- Special Operations Control

Real-time Emergency Event Response



Automatic Detection and Handling of Reverse Overflow.



Special Area Slow Entry Fast Exit Strategy.

Multidimensional Visualization of Traffic Data

Traffic Data Statistics
Section Flow, Average Vehicle Speed, Headway, Spacing Between Vehicles, Queue Length, Travel Trajectory, Vehicle Type

Traffic State Analysis
Leveraging real-time traffic data and GIS geographic information to create a digital twin holographic intersection, monitoring the city's traffic congestion in real-time.

Intersection Dynamic Information Display

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Intelligent Highway Full-range Monitoring System

√ Full Trajectory √ High-Precision Maps √ Event Monitoring √ Real-time Alerts

Basic Traffic Data Collection

Sectional Statistical Data
Traffic Volume, Average Speed, Headway, Virtual Loop Occupancy Time.
Lane Data
Queue Length, Lane Travel Speed.
Radar Observation Zone Data
Online Vehicle Count, Incoming Lane Travel Speed, Outgoing Lane Travel Speed.
Real-time Vehicle Data
(X, Y) Coordinates, Y-direction Velocity.
Operations and Maintenance Management

Traffic Incident Detection and Reporting

Abnormal Parking,

Debris Detection

Queue, Overspeed, Wrong-Way Detection

Emergency Lane Occupation Detection

Congestion Detection
- Congested segment alert,
- High traffic flow segment notification,
- Anomalous confluence notification,
- Structured information archiving

Segment Traffic Situation Display


Overview of Traffic Situations Based on High-Precision Maps.


Key Sections, Key Observations


Display of Traffic Incident Details

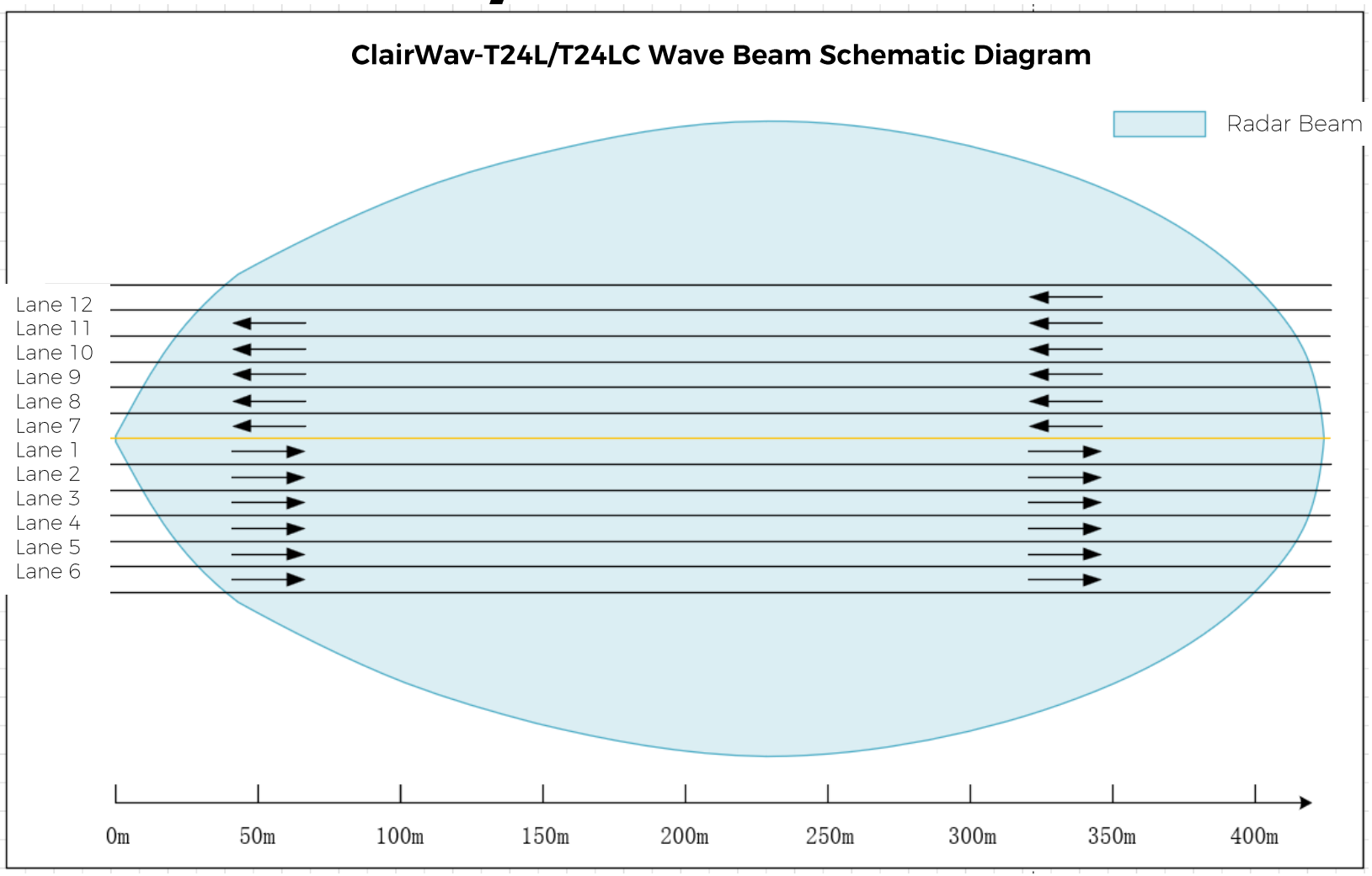
Multidimensional Traffic Data Analysis

Single Point Analysis
Traffic Data Analysis
Section Operation Trend Analysis
Traffic Incident Analysis

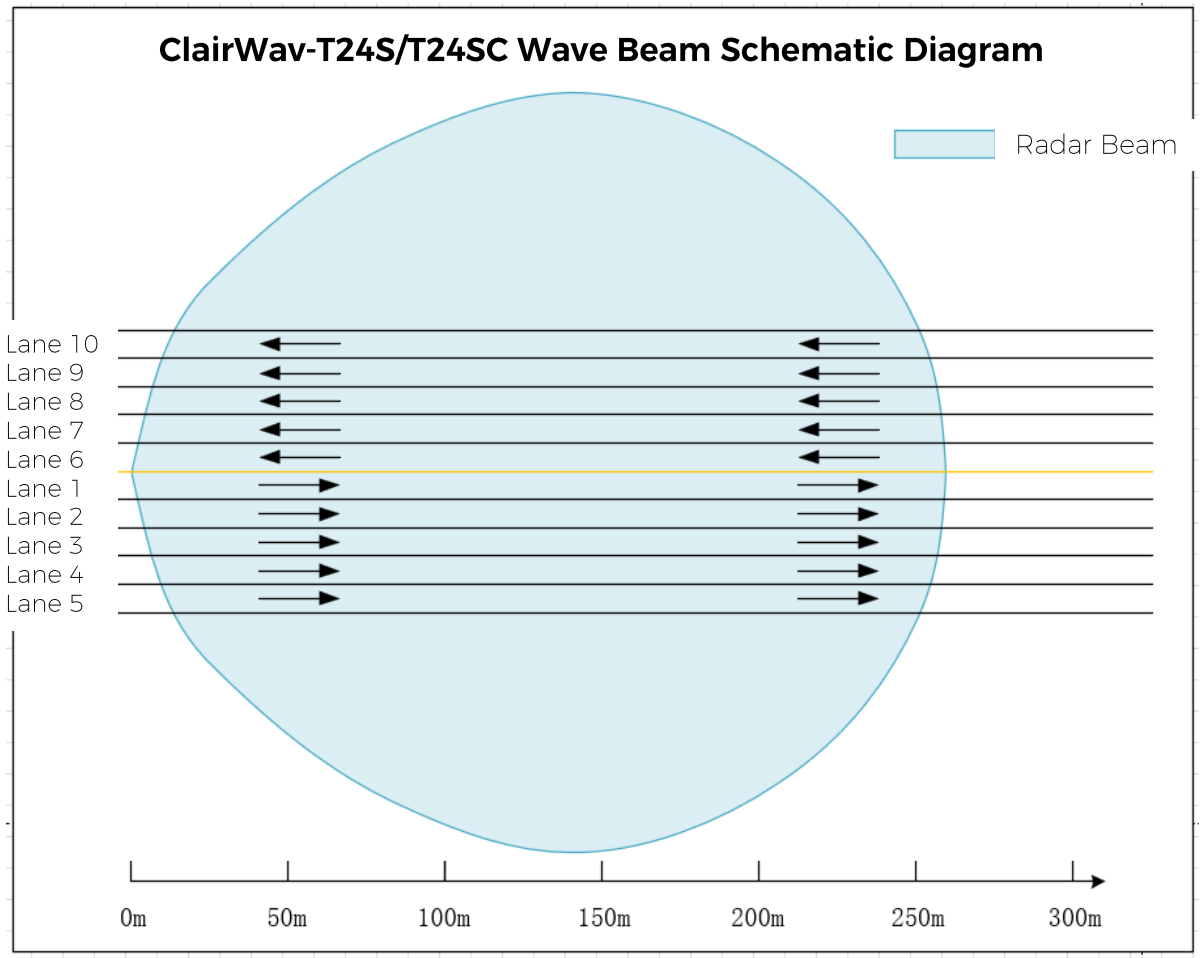
Section Analysis
Traffic Data Analysis
Section Operation Trend Analysis
Traffic Incident Analysis

Multi-Section Joint Analysis
Combined Data Analysis
Combined Event Analysis

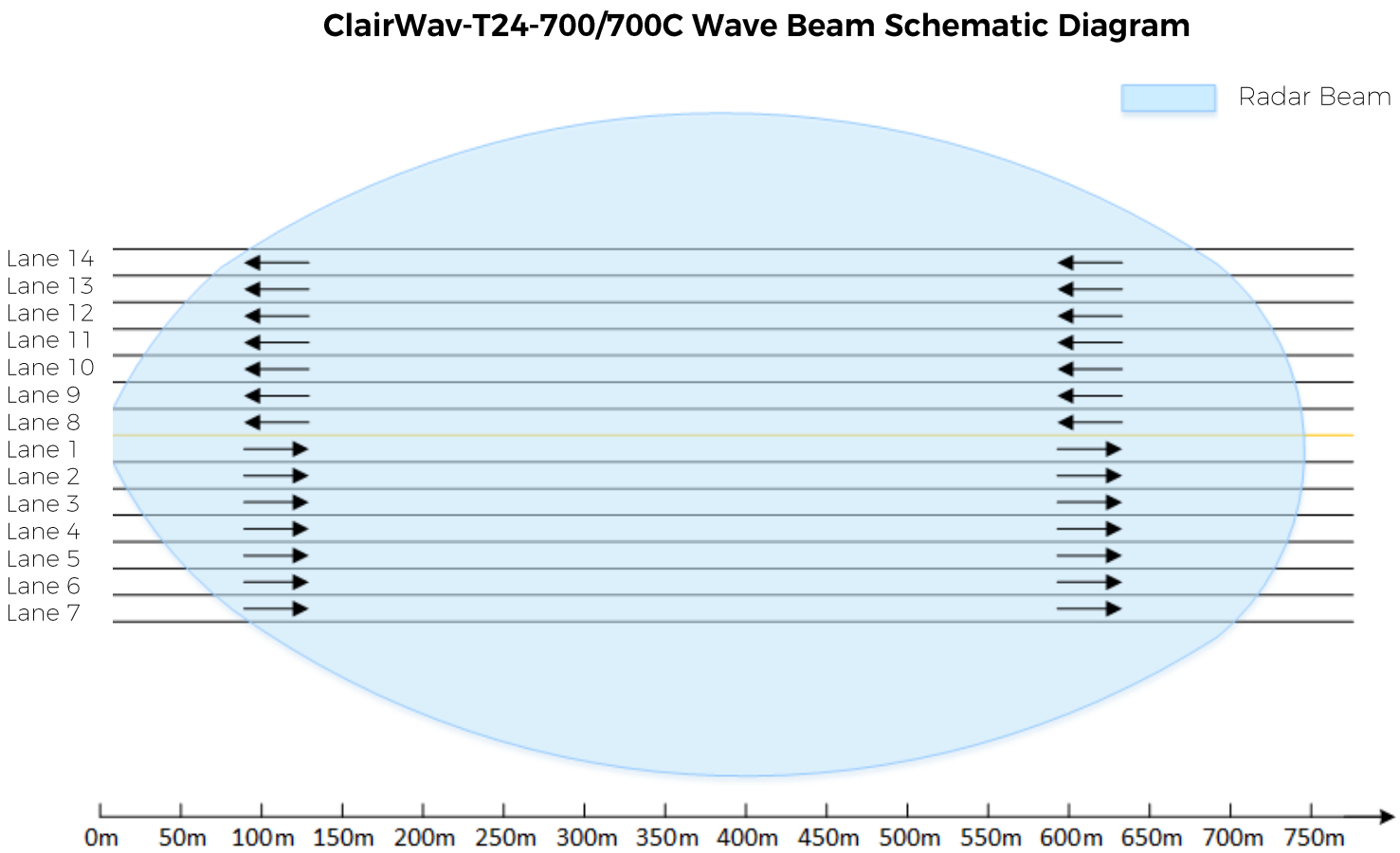
Beam Diagram: ClairWav-T24L/T24LC



Beam Diagram: ClairWav-T24S/T24SC



Beam Diagram: ClairWav-T24-700



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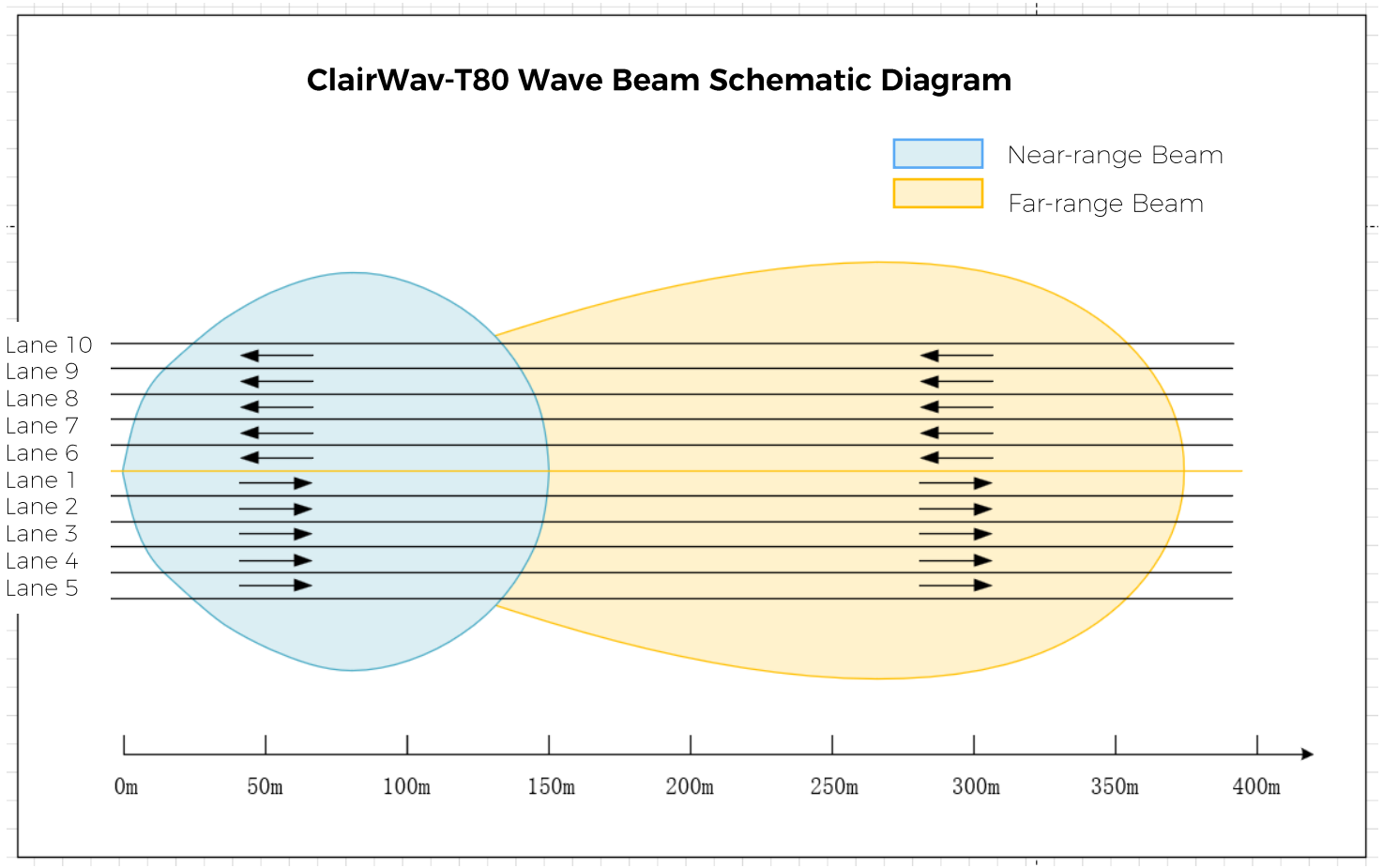
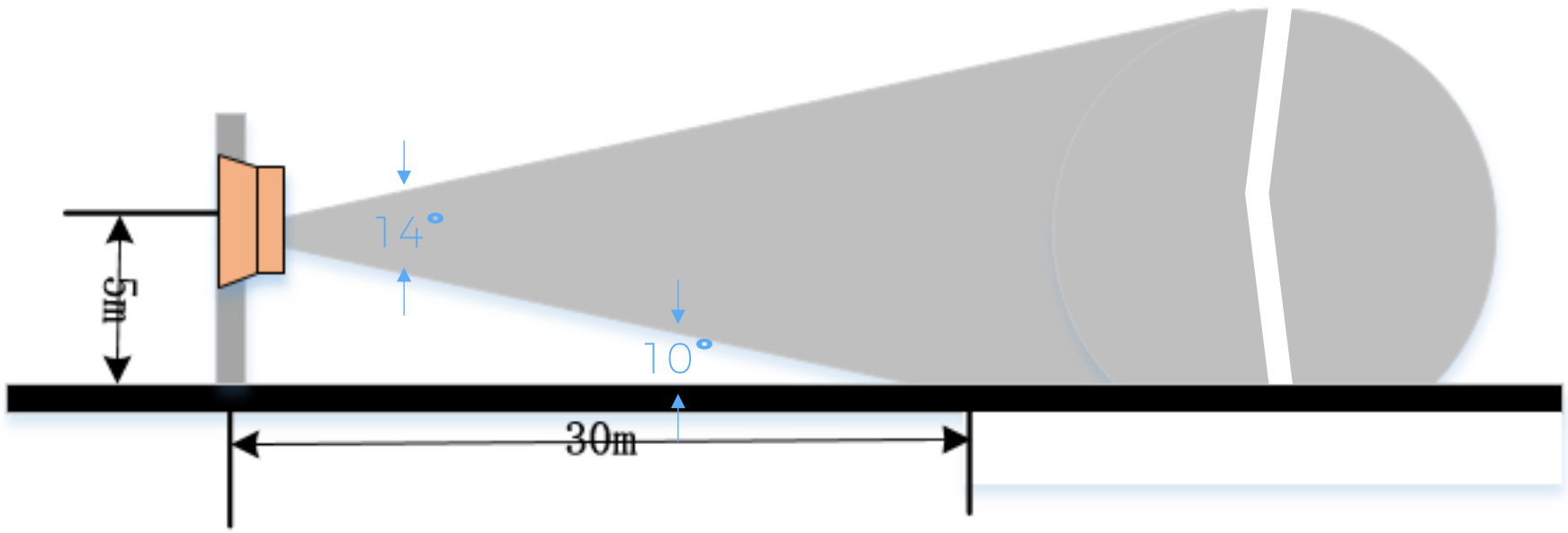
Beam Diagram: ClairWav-T80



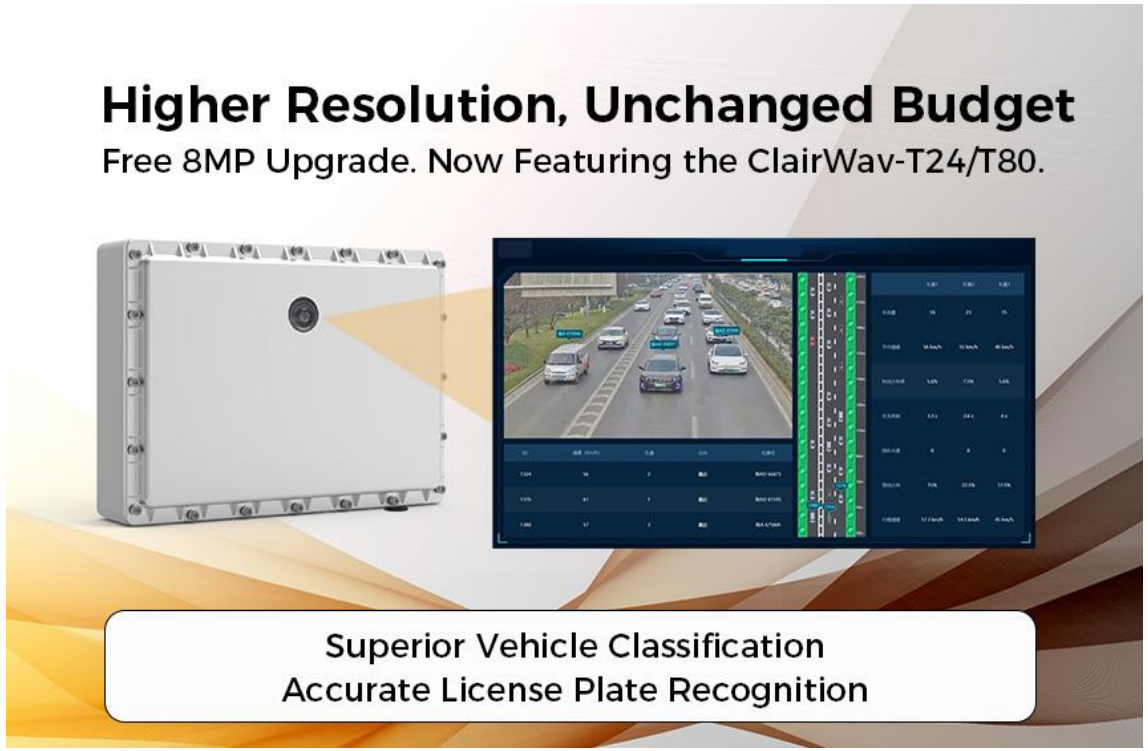
Vertical Beam Diagram



For both T24/T80.

ClairWav-T24/T80 Just Got Sharper

Now with 8MP, at No Extra Cost!



What's New:

- Crisp 8MP Resolution – Capture ultra-clear video at up to 3820×2160
- Drastically Improved Accuracy – Achieve superior vehicle classification and license plate recognition
- Advanced Radar-Video Fusion – Seamlessly integrate radar tracking with high-definition imaging
- Superior Low-Light Performance – See clearly even in 0.01 lux conditions
- Smart Features – Including H.265+ encoding, WDR, de-fog, and digital noise reduction

Detailed News **Product Webpage**

Camera Specs & Vehicle Classifications

Camera Specs

Camera integrated Radar	Supports radar and video coordinate fusion.
Lens	16mm focal length, FOV 31*27.5*15.5
Minimum illumination	0.01lux (F1.6, AGC ON)
Resolution	Maximum 3820*2160
Smart encoding	H.265+
Frame rate	(1-25) frames per second, adjustable
Bitrate	32 Kbps-16 Mbps
ONVIF Protocol	Support
Day/night switching	IR-CUT automatic switching
De-fog	Support
WDR (Wide Dynamic Range)	Support
Digital noise reduction	Support
White balance	Support
OSD	Support

Vehicle Classifications

	Radar	**Video integrated Radar**
1	Length <5m	Sedan
2	Length between 5-15m	SUV/MPV
3	Length >15m	Bus (public bus, coach)
4		Medium-sized passenger van (e.g., bread van, Coaster)
5		Small truck
6		Medium truck
7		Large truck
8		Construction vehicle
9		Motorcycle (including electric motorcycles)
10		Tricycle
11		Bicycle
12		Pedestrian

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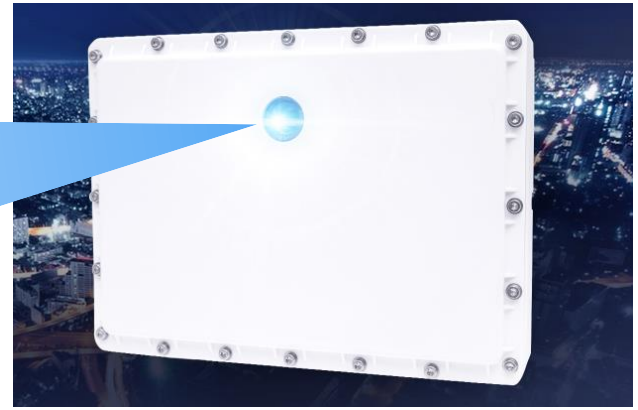
Camera Integrated Radar





- Utilize an 8-megapixel camera for capturing wide scenes
- More intuitive video visualization
- Vehicle characteristic information collection

Advantages of camera integrated Radar

1. Intuitive Display:

Video can show the targets detected by radar in real-time, allowing operators to visually observe the movement and characteristics of the targets.

2. Accurate Identification:

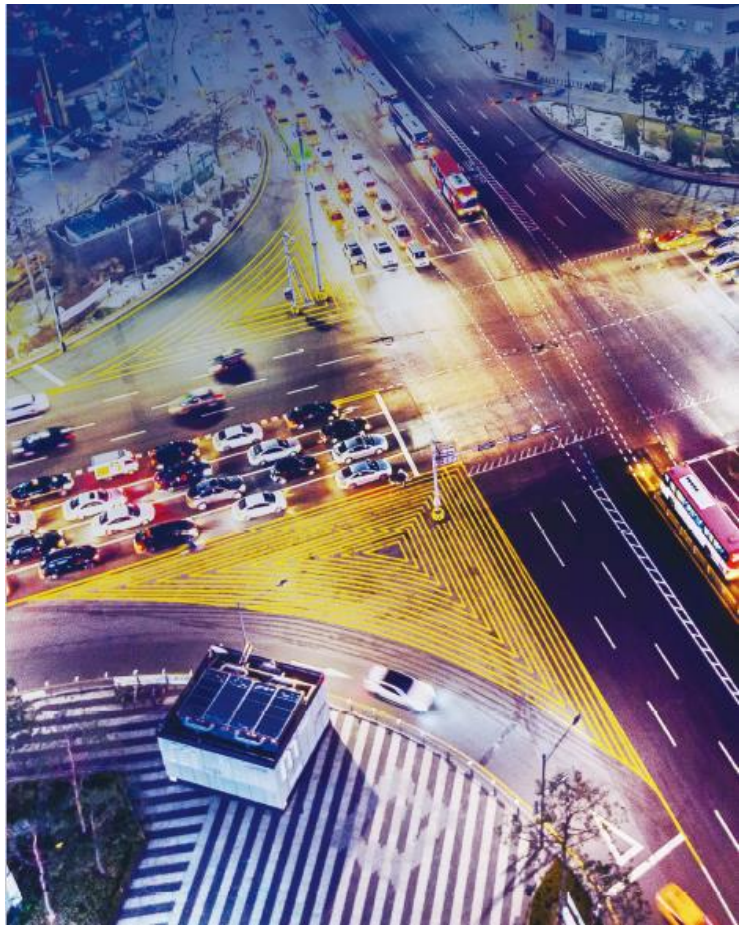
Video can provide more target information, such as shape and color, and when combined with radar detection data, targets can be identified more accurately.

3. Multi-target Tracking:

The multi-target tracking capability of phased array radar, combined with video technology, allows for simultaneous tracking of multiple targets, with each target marked and displayed on the video.

4. Data Fusion:

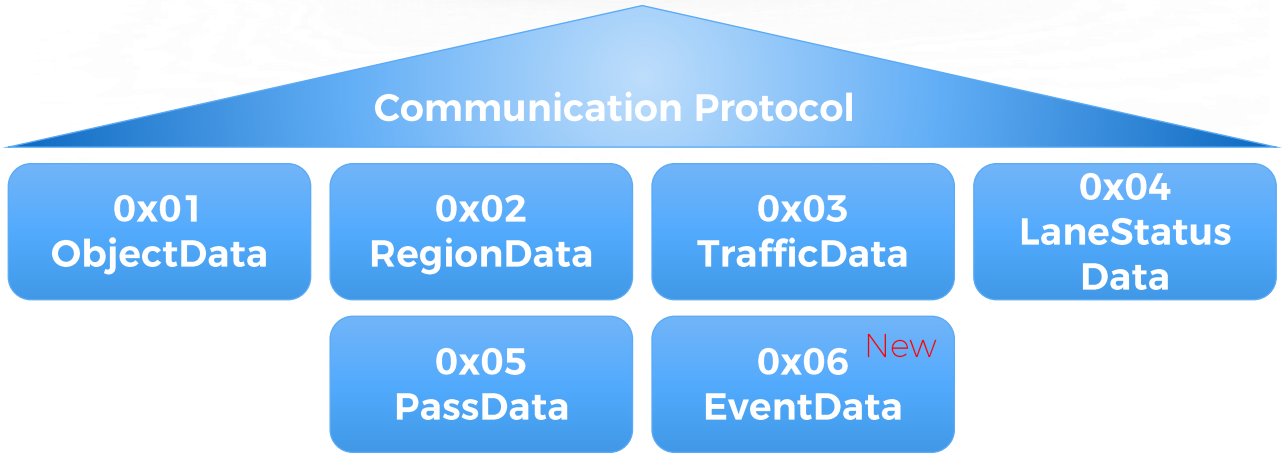
By integrating radar data with video data, more comprehensive and accurate target information can be obtained, improving the overall performance of the system. With this radar, video can supplement radar's ability to detect stationary targets that might otherwise be missed and increase the accuracy



Enhancing Urban Traffic Signal Control with Camera-Integrated Radar Systems

Camera Integrated Radar





1. Real-Time Traffic State Perception & Adaptive Signal Control
Target Trajectory Data (ObjectData) provides real-time position, speed, acceleration, and direction of each vehicle or object. This allows:

2. Traffic Flow Optimization
Traffic Flow Statistics (TrafficData) includes: vehicle counts per lane and type (car, bus, truck, etc.) and average speed, headway, occupancy, and queue length

3. Lane-Level Management and Prioritization
Lane Status Data (LaneStatusData) provides queue length, head/tail position, number of queued vehicles, and real-time spacing, lead/trailing vehicle speed

4. Multi-Modal Traffic Support
Vehicle Type Classification (from both ObjectData and TrafficData) distinguishes:Cars, buses, trucks, motorcycles, bicycles, and pedestrians

5. Intersection Performance Monitoring
6. Real-Time Incident and Anomaly Detection
7. Data-Driven Planning and Simulation
8. Enhanced Coordination Between Intersections
9. Support for Smart City and V2X Applications

Detailed News

Communication Protocol

Plate Number Identification with ClairWav Radar-Camera Fusion



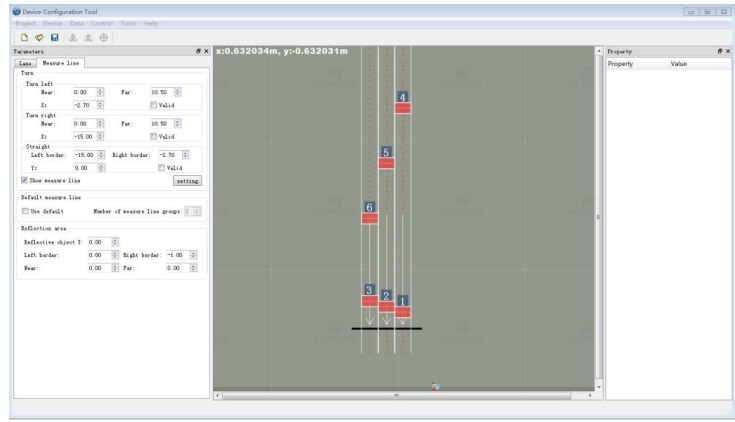
The ClairWav microwave radar family, now integrated with a high-resolution 8MP camera, enables real-time vehicle license plate recognition (LPR). This advanced fusion of radar tracking and visual data provides a powerful tool for precise vehicle trajectory tracing and automated traffic enforcement.

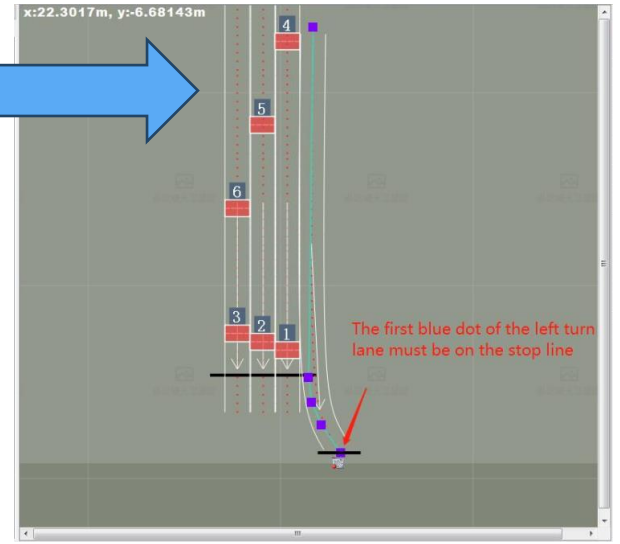
To ensure high accuracy across different regions, the system can be customized through training on a localized dataset of license plates.

Check Video on Youtube
Product Webpage

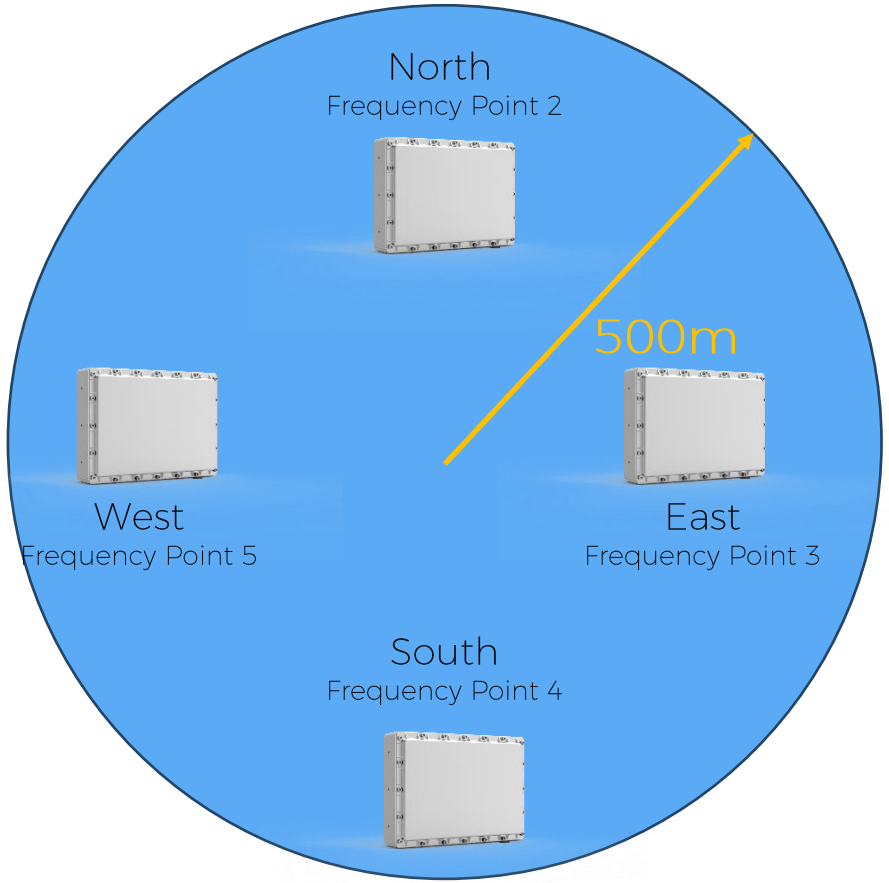
Advantages of forward firing compared with side firing

	Advantages of forwarding firing compared with side firing
Field of View	• Focused on long-range detection (250-400m), Suitable for detecting objects or obstacles at a distance directly ahead, such as other vehicles, pedestrians, or road obstructions. • Higher accuracy for the detection of extra long queue. Can follow the vehicle for much longer distance as well.
Multiple Targets	Support up to 256 multiple targets.
Cross Sections (Measuring Lines /Virtual loops)	• Support maximum 64 cross sections (measuring lines or virtual loops) • Support maximum 16 cross sections per each lane
Side Mounting Support	• Usually mounted at the front of the vehicle or system, often integrated into the grille, bumper, or windshield area. • Also support side mounting in highway applications, managing multiple lanes, providing data per each lane.
Vehicle Trajectory	Support vehicle trajectory data which will be important for applications like V2X.

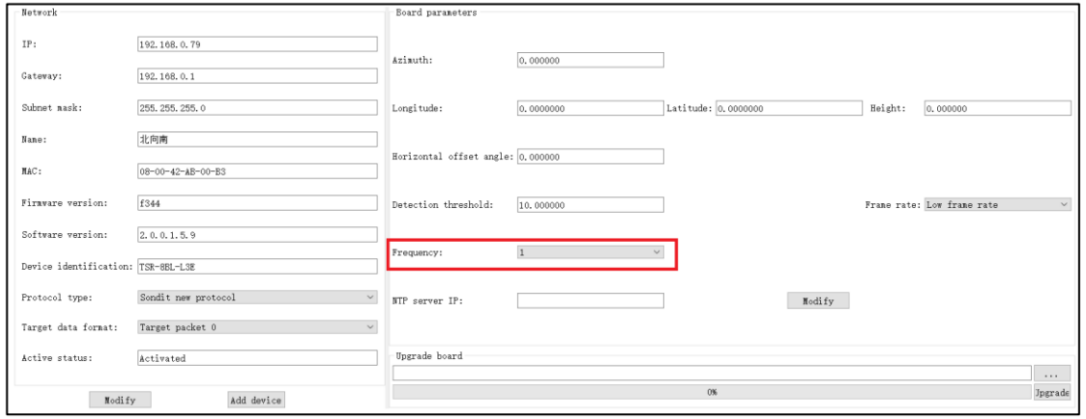




Different Frequency Points for Anti-interference with Radars Close By



Up to 6 frequency points are available for radars installed within 500m radius region to avoid interference from each other.



Traffic Management Platform

City Traffic Management Platform



- Comprehensive Traffic Condition Overview
- Route Analysis
- Individual Intersection Detailed Analysis
- Traffic Volume Data Analysis
- Traffic Diagnosis Operation
- Maintenance Management

Youtube Video Demo

Highway Management Platform



- Comprehensive Traffic Condition Overview: Traffic condition observation, traffic data monitoring, intersection dynamics monitoring;
- Traffic Time Detection
- Early Warning Special Strategy Control Guidance Screen Control

Youtube Video Demo

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Platform Overview

The platform integrates traffic information within the road network, building a comprehensive road traffic data archive.

It includes traffic analysis, traffic situation simulation, and equipment maintenance management, forming a big data platform for road network traffic.



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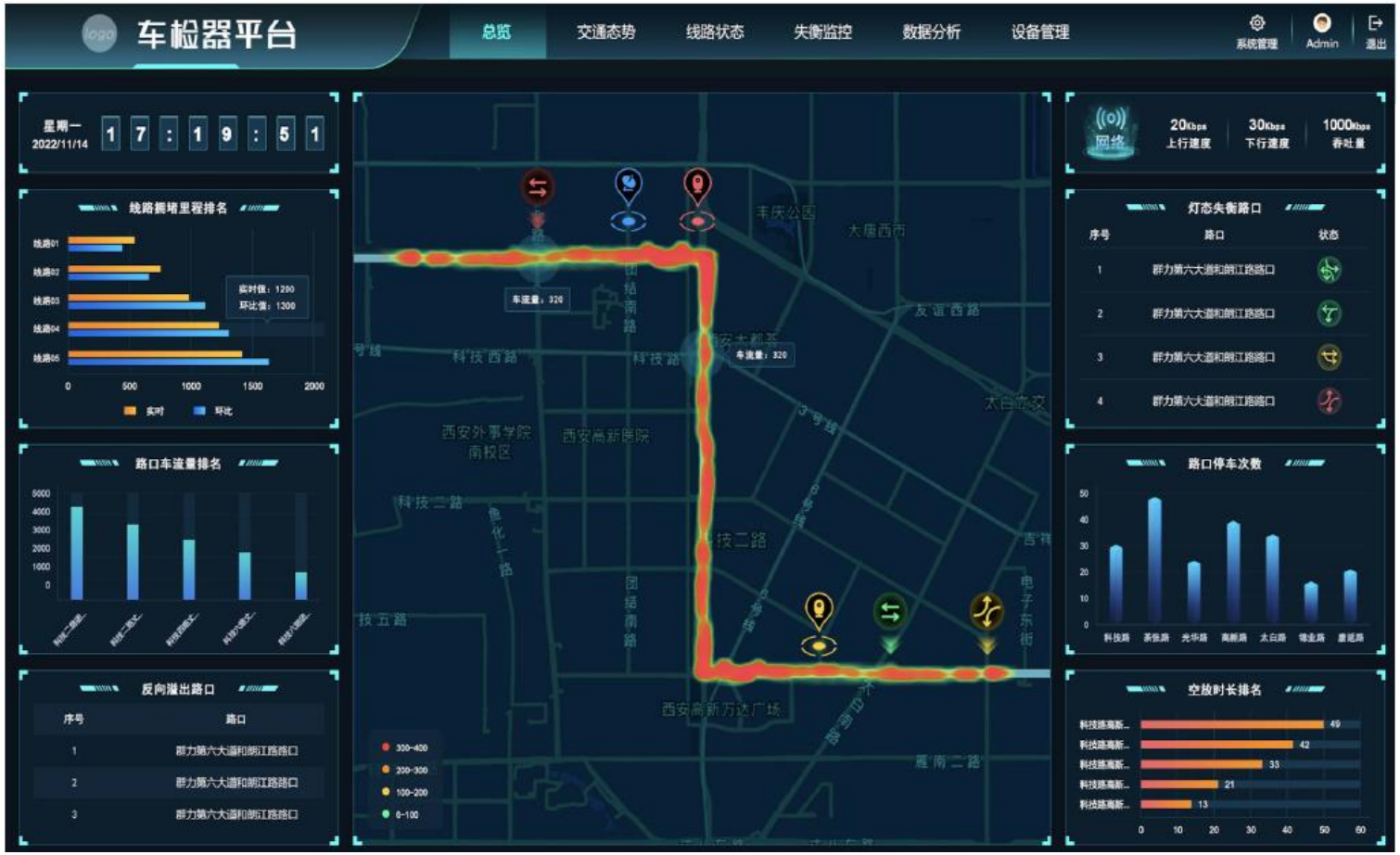
Platform Overview

Combining with GIS maps, it displays an overall traffic heatmap.

Traffic Overview

The platform combines the city's road network with real-time traffic conditions to monitor and compile statistics on overall traffic status and traffic performance indicators.



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Platform Overview

Custom Display of Traffic Indicators



Ranking of Congested Route Mileage



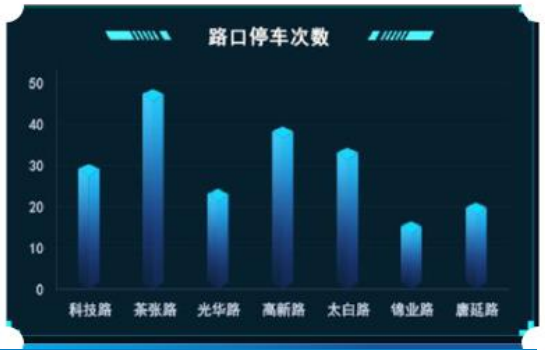
Intersection Traffic Flow Ranking



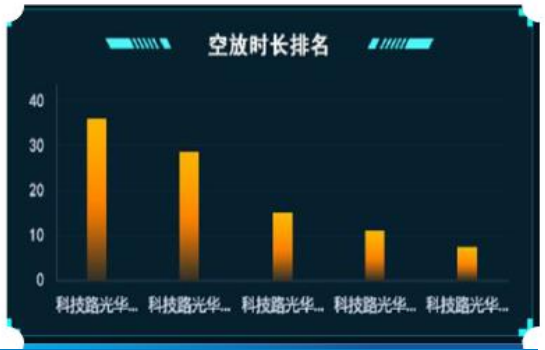
Reverse Spillback Intersections



Signal Imbalance Intersections



Number of Stops at Intersections



Idle Time Ranking

Platform Key Functions

Custom Display of Traffic Metrics

Traffic Situation

Based on the traffic situation of each route, using GIS maps and relevant data, generate the status of routes and intersections:

- Ranking of Congested Intersections
- Signal Imbalance Intersections
- Intersection Traffic Flow

Additionally, use different colors on the map to indicate the level of road congestion.



Platform Key Functions

Detailed Display of Intersections

Detailed Intersection Analysis

- Digital Twin of Intersection Operations
- Simulation Trajectory Viewing
- Intersection Traffic Flow Analysis
- Comprehensive Evaluation Metrics for Intersections



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Platform Key Functions

Route Congestion Status Display and Green Wave Diagnosis

Route Status

Dynamically display the real-time distribution of vehicle clusters, average vehicle speed, number of stops, and other information to assist users in green wave diagnosis.



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Platform Key Functions

Evaluation of Intersection Signal Cycle Plan Effectiveness

Imbalance Monitoring

- Obtain real-time signal plans for intersections.
- Provide signal phase traffic flow data.
- Comprehensive statistics: average number of stops, green light idle time, idle time ratio.
- Issue warnings and report phase imbalance information.



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Platform Key Functions

Recommendations for Optimizing Intersection Signal Control Plans

Evaluation and Analysis of Signal Control Plans for Imbalanced Intersections

- Analyze the current imbalance status of intersections.
- Summarize and compile data on the number of imbalances for each signal plan phase and specific imbalance data.
- Provide corresponding recommendations for signal timing optimization.



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Platform Key Functions

Data Analysis: Traffic Flow Analysis

Data Analysis: Traffic Flow Data

Display traffic flow data for a selected time period and segment:

- Total Traffic Volume
- Traffic Volume by Direction
- Incoming Turn Ratios
- Outgoing Flow Integration
- Traffic Saturation Distribution



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Platform Key Functions

Visualization of Traffic Data Analysis

Data Analysis: Traffic Data

Display traffic data for a selected time period and intersection:

- Average Vehicle Speed
- Travel Speed
- Congestion Index
- Maximum Queue Length



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Platform Key Functions

Multi-dimensional Comparison of Traffic Data Across Different Intersections

Data Analysis: Data Comparison

Compare traffic data for different intersections over various time periods:

- Average Traffic Volume
- Travel Speed
- Congestion Index
- Maximum Queue Length



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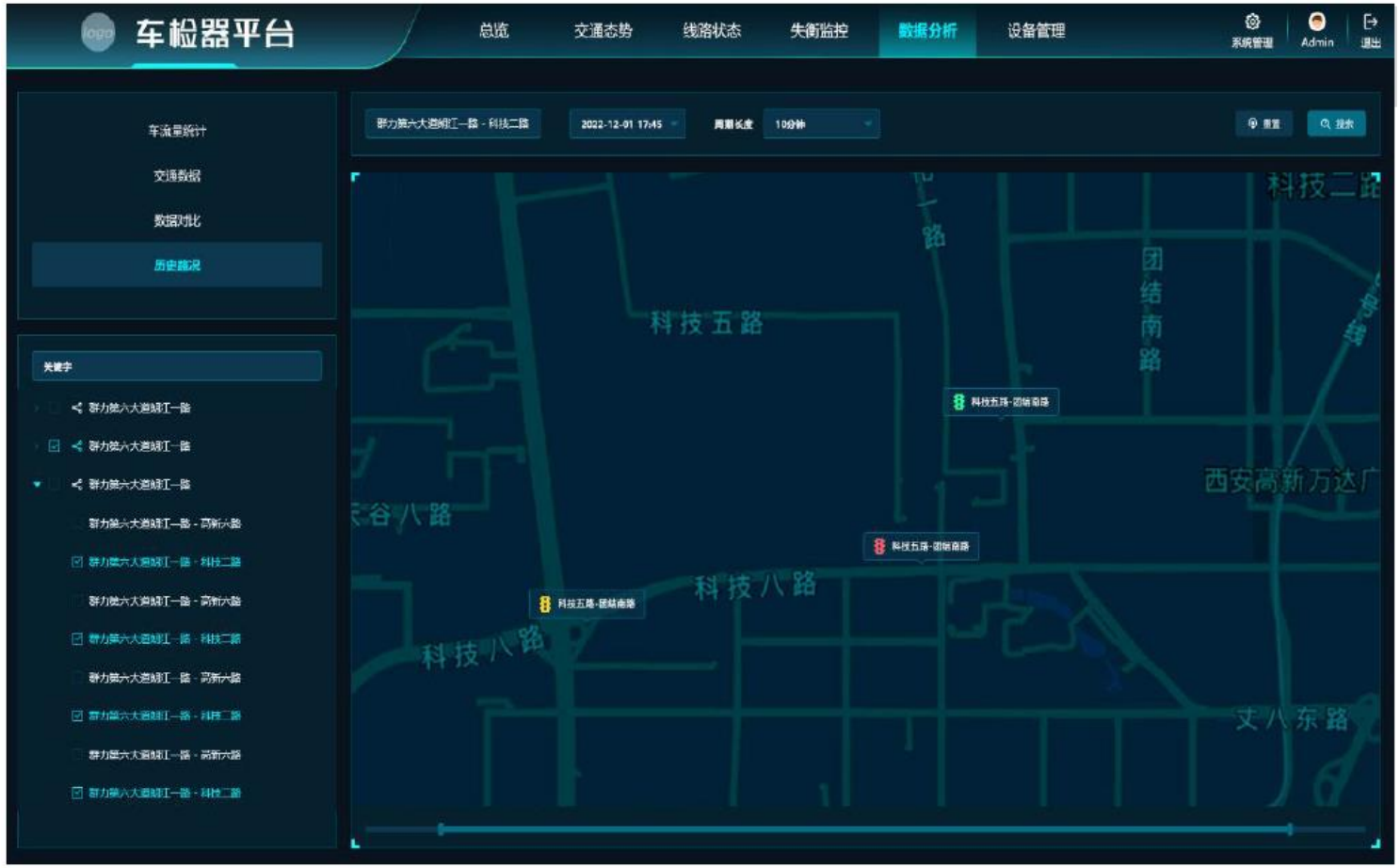
Platform Key Functions

Historical Route Condition Playback

Data Analysis: Historical Traffic Conditions

- Query and playback historical road network congestion conditions.



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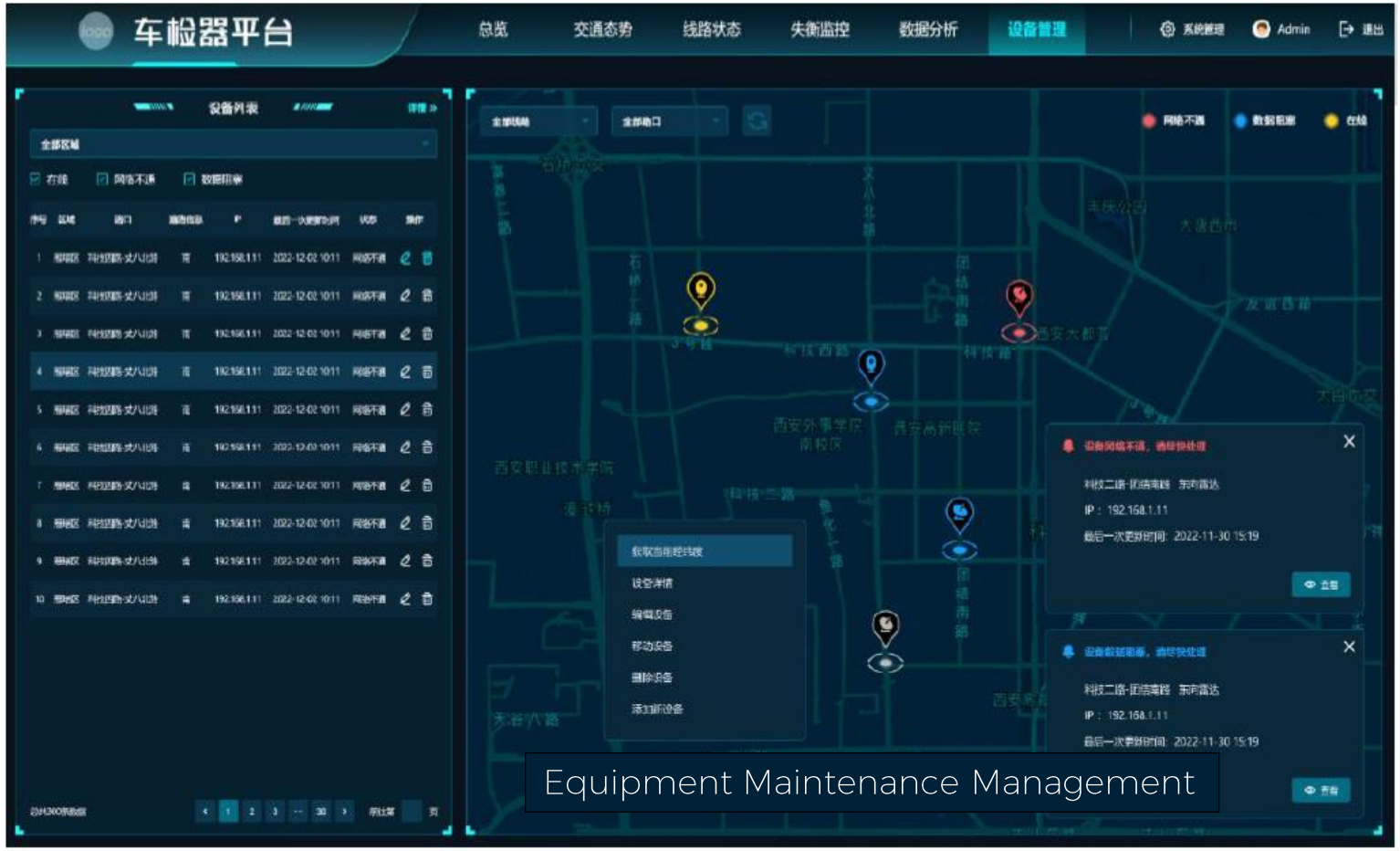
Platform Key Functions

Full Lifecycle Monitoring of Equipment

Equipment Management:

- GIS-Based Equipment Management
- Device Online Status
- Equipment Fault Alerts



Platform Key Functions

System Management





01. Equipment Management

- Equipment Maintenance Management

02. User Management

- User Authority Management

03. Intersection Management

- Intersection Maintenance Management

04. System Configuration

- Layout and Data Level Customization

05. Data Verification

- System Data and Traffic Data Verification

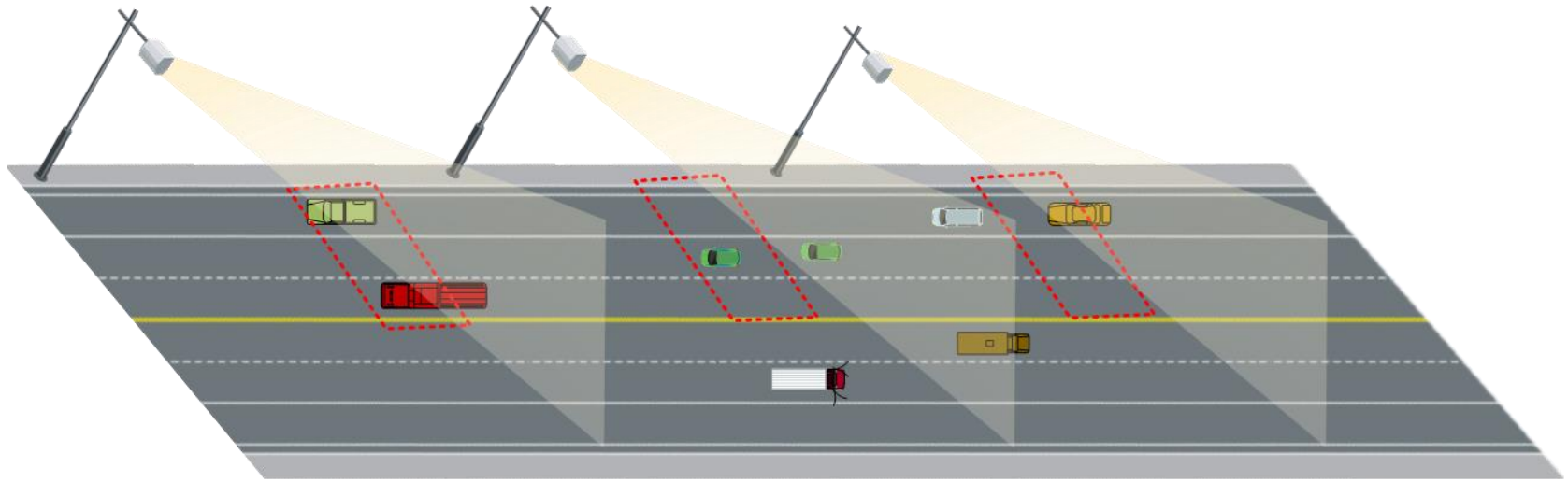
06. User Log

- Historical Operations and Anomaly Information Traceback

Applications

Road Traffic Information Collection

- Real-time and accurate collection of road traffic volume, speed, headway time, occupancy rate, and other data
- Alerts for traffic events such as queuing, wrong-way driving, speeding, and abnormal parking
- Real-time display of traffic status
- Data processing for traffic flow trends, congestion prediction, and traffic operation indices



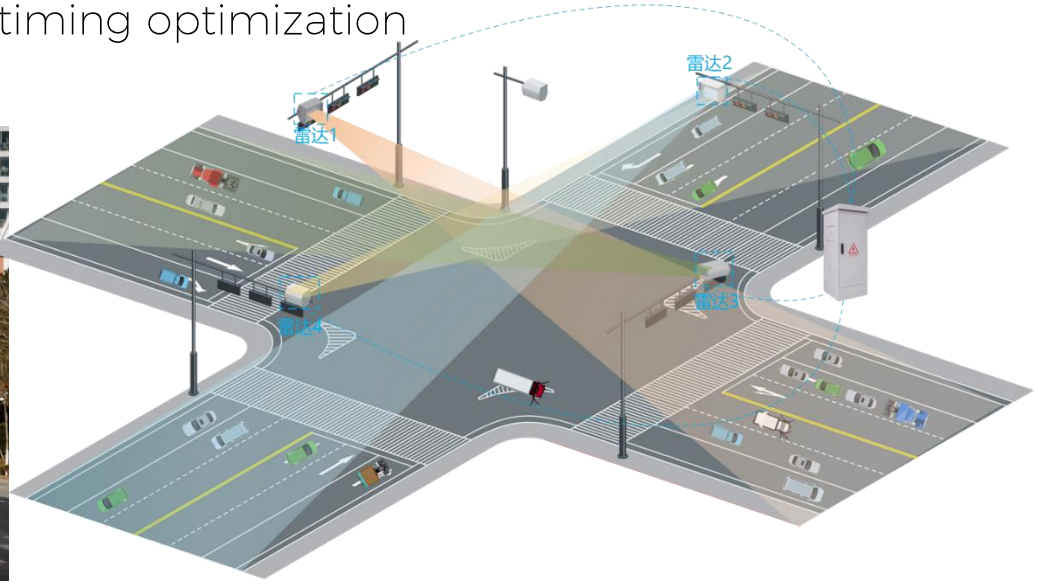
Applications

Urban Intersection Traffic Flow Detection

- Real-time and accurate collection of intersection traffic volume, speed, headway time, occupancy rate, and other data
- Real-time and accurate output of queue length, average speed, and other data
- Real-time display of traffic status
- Data processing for traffic flow trends, congestion prediction, and traffic operation indices
- Support for real-time control of traffic signals and signal timing optimization



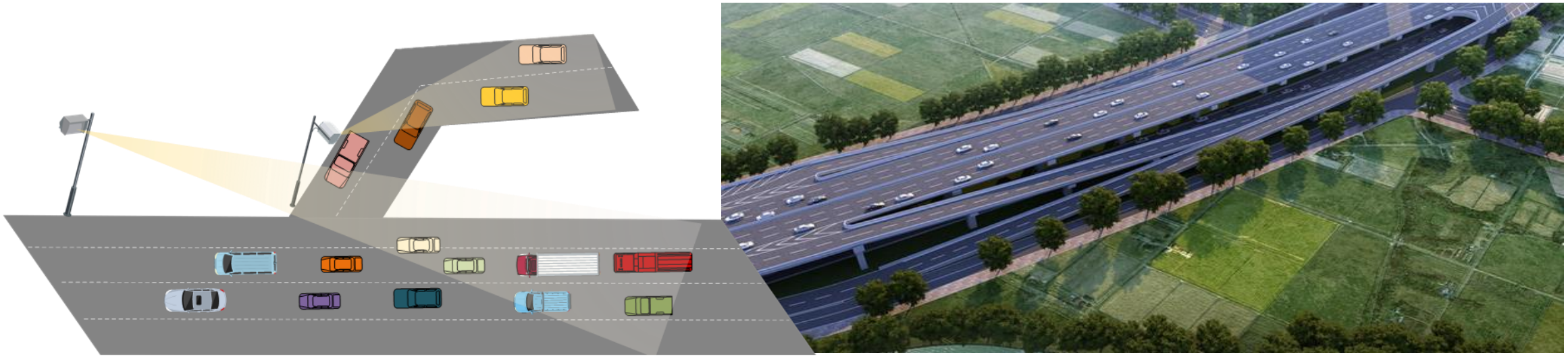




Applications

Urban Expressway Sensing

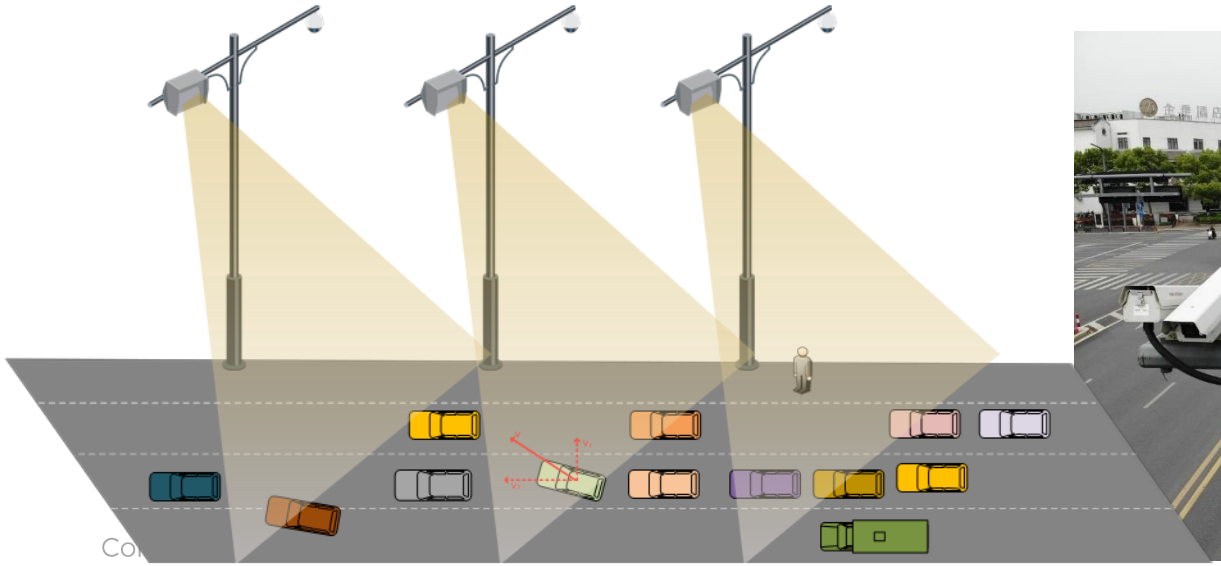
- Traffic signal control for expressway ramps
- Full monitoring of expressway mainline
- Event detection and warning at expressway merging points
- Data collection: congestion, wrong-way driving, slow traffic, abnormal parking, illegal lane changes, pedestrian intrusions, target attributes/location/speed/trajectory, speeding, road obstacles



Applications

V2X

- Comprehensive Traffic Information Sensing: High-precision, multi-source fusion traffic flow parameter information (target attributes, real-time location, real-time speed, trajectory, regional status, etc.)
- Abnormal Event Detection and Warning: Over-speeding/under-speeding, parking, wrong-way driving, lane changes, congestion, foreign objects, intrusions, etc.
- Vehicle Behavior Analysis: Tracking vehicle trajectories, monitoring illegal lane changes, vehicle chases, and other behaviors
- Data Collection: Target type (small vehicle, medium vehicle, large vehicle), target speed, real-time location, real-time speed, trajectory, etc.



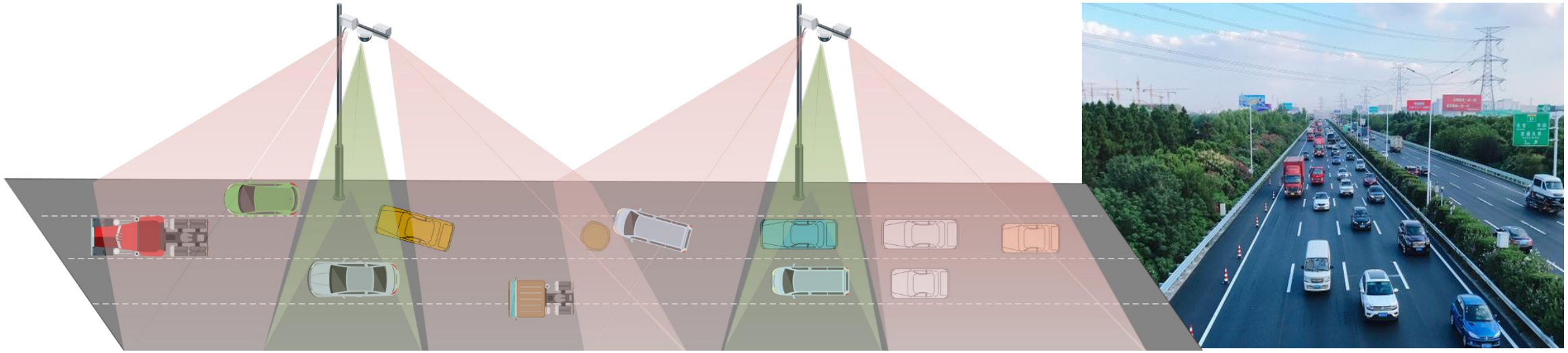




Applications

Smart Expressway

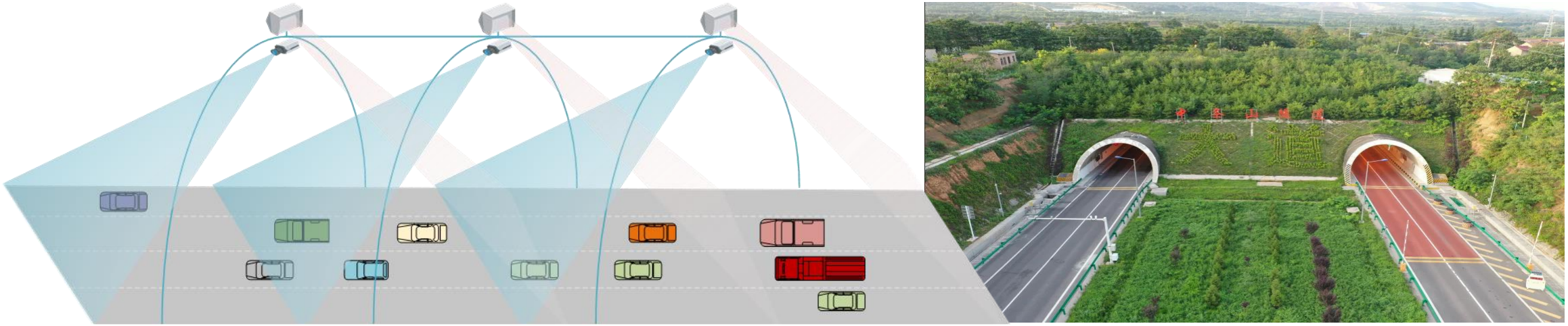
- Traffic Data Collection: Sectional statistics, lane data, radar observation area data, real-time vehicle data.
- Traffic Incident Detection: Abnormal parking detection, wrong-way detection, emergency lane occupation detection, debris detection.
- Traffic Situation Analysis and Road Operation Reporting: Congestion alerts, high traffic volume segment notifications, abnormal flow in/out gate alerts.
- Traffic Flow Guidance...



Applications

Smart Tunnel

- Tunnel Event Real-time Monitoring, Proactive Warning
- Special Vehicle Tracking in Tunnels (Passenger and Hazardous Goods)
- Integrated Management of Smart Tunnels
- Tunnel Passage Status, Real-time Vehicle Trajectories, Sectional Data, Area Data, Lane Data, Tunnel Traffic Incidents



Cases

Onsite installs +10,000 pcs, and covers 1000+ streets

Qingdao Jiaozhou Comprehensive Smart Sensing and Signal Control System



- Road Throughput Efficiency Improvement: **30%**
- Peak Intersection Vehicle Queue Length Reduction Rate: 50%+
- Per Capita Annual Saved Travel Time: 60.8 hours
- Citywide Annual Saved Fuel Consumption: 14.6 million liters (Citywide traffic volume approximately 300,000 vehicles)

Shandong, Heze, Signal optimization system. Green wave control and multi-intersection coordination



- During peak hours, the duration of congestion has decreased by 78.9%,
- leading to a traffic efficiency improvement of **40%** or more.

Jinan, Shandong Signal optimization system deployed at key intersections



- Congestion and slow-moving traffic reduced by **64.3%**
- Total reduction in daily congestion time: 79.4%
- Total reduction in daily slow-moving traffic time: 54.2%
- Overall reduction in total duration of congestion and slow-moving traffic throughout the day: 155 minutes

Linfen, Shanxi Gu Lou Roundabout



- Reduction in evening peak congestion time: 60.4 minutes
- Percentage reduction in evening peak congestion time: **47%**

Cases-Signal Control

Citywide Deployment of Smart Sensing

	Background	Result
	Location: Shandong Province With urban economic growth, both old and new city areas face heightened traffic pressure. Enhancing traffic efficiency and improving the commuting environment are pressing needs for urban development and bettering people's lives. Enhancing traffic efficiency and improving the commuting environment are pressing needs for urban development and bettering people's lives.	• Deployed at over 340 intersections • Road throughput efficiency improved by 30% • Peak intersection queue length reduction rate: over 50% • Average annual time saved per person: 60.8 hours • Annual city-wide fuel savings: 14.6 million liters (based on approximately 300,000 vehicle trips per day citywide)

TraffiClair

Cases-Signal Control

Bi-directional Dynamic Green Wave Bands

Background

Location: Jiangxi Province

The project is on a major urban artery, near key institutions like the municipal. It connects the university district to the east, the train station to the south. Heavy traffic causes peak hour congestion, affecting travel.



Solution:

Two bi-directional dynamic green wave bands and 10 intelligent signal-optimized intersections.

Dynamically adjust signal timing based on real-time traffic flow, facilitating on-demand passage.

Result



Before

The vehicle queue is excessively long, extending beyond the preceding intersection.



After

Intelligent management and control at the intersection have significantly reduced congestion.

- **During the morning peak hours, the average congestion time decreased by 100%**
- **During the evening peak hours, the average congestion time decreased by 82%**

Cases-Signal Control

Intersection Adaptive Control

Background

Location: Shandong Province

The project is situated along the Yellow River transportation corridor, serving as a main artery in an area where old and new urban districts coexist. During peak hours, issues like "secondary queues" and reverse overflow are prominent, making it difficult for the existing fixed timing schemes to optimize intersection throughput in real-time.

Solution:

Deploying a signal optimization system at the core intersection in the area, dynamically adjusting signal timing based on real-time traffic flow with millisecond-level control.

Result



Before

Frequent occurrences of secondary queues are observed, and green lights are left unused during periods of traffic saturation.



After

Adjusting signal control parameters in real-time based on traffic flow to eliminate occurrences of secondary queues and green light wastage.

- **Total congestion time per day reduced by** **79%**
- **Total slow-moving traffic time per day reduced by** **54%**

Cases-Signal Control

The Central Roundabout Area Signal Optimization

Background

Location: Shanxi Province

The Drum Tower roundabout, located in the heart of a city, is a landmark structure surrounded by administrative, educational, medical, residential, and recreational areas. High traffic volumes in all directions during the day. This congestion often spills over into queues, impeding traffic flow in other directions and causing congestion to spread.

Solution:

Deploying real-time traffic signal optimization systems at intersections surrounding the roundabout, coordinating central-to-peripheral control to generate control strategies that closely match the traffic conditions in real time.

Result



Before

Vehicles merge into the roundabout without order, causing overflow. During peak hours, congestion persists for up to 128.6 minutes.



After

Coordinated control at the peripheral intersections of the roundabout ensures orderly entry and exit of vehicles.

- **Total congestion time per day reduced by** **47%**

Cases-Signal Control

The Cross-River Avenue Signal Optimization

Background

Location: Major city in China.
The project is in a city with high motor vehicle numbers, among the highest nationally. Roads face heavy traffic, especially on the main urban artery, leading to severe congestion during peak hours. This congestion spills over into upstream intersections, causing inconvenience for residents and hindering urban development.

Solution:
Signal timing on Cross-River Avenue is dynamically adjusted based on traffic saturation levels.
This coordinated control reduces secondary stops during peak hours with longer signal cycles and eliminates green light waste during off-peak hours with shorter cycles.

Result



Before
Multiple streams of traffic converge onto the bridge, but the clearance efficiency is insufficient. Vehicles fill the bridge, resulting in a queue length of 1.7 km.



After
The system implements max efficiency clearance by dynamically adjusting phases. During peak hours, the queue is reduced to 650m, ensuring smooth passage across the bridge.

- **During peak hours, there has been a reduction of**

78.9%

in the duration of congestion.

Cases-Signal Control

High Random Traffic Flow at the Train Station

Background

Location: Major city in China.
The project is at a key intersection near a major train station in a new first-tier city. The station is along a main city artery and experiences high passenger flow. Despite fixed timing schemes, occasional surges in random traffic flow led to oversaturation and reverse overflow, impacting traffic on the main road.

Solution:
To address the high traffic demand and random congestion around the train station, we have developed specific scenario algorithms.
These algorithms utilize real-time traffic information collected from train station to dynamically adjust traffic signals with millisecond-level control.

Result



Before
Fixed timing schemes cannot match random traffic flows.

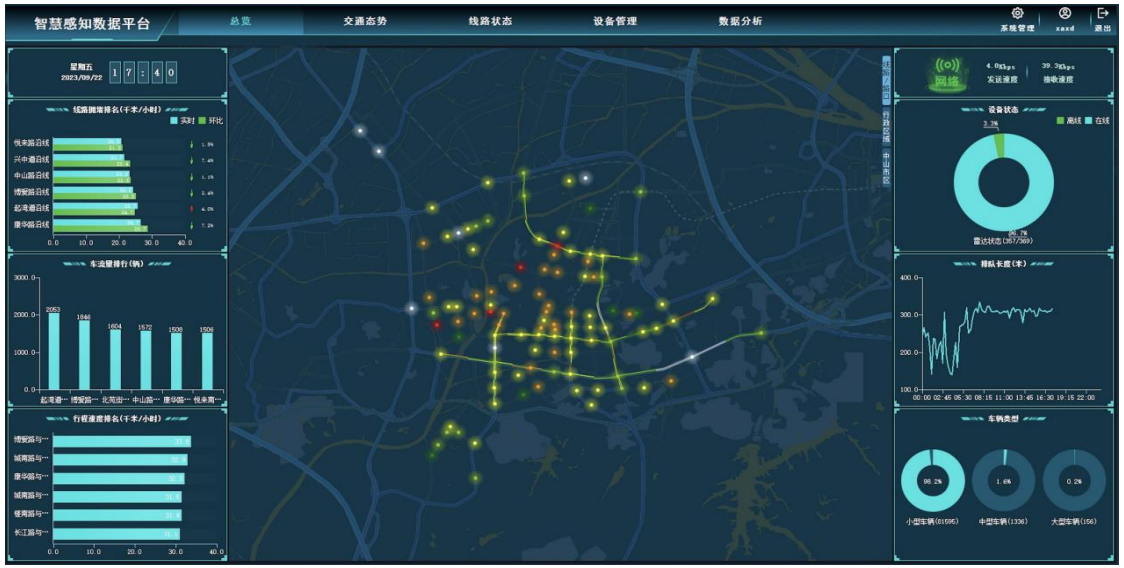


After
Signal timing is dynamically adjusted based on real-time traffic flow.

Average reduction in congestion throughout the entire weekend: **2 hours**

Cases-Situation Monitoring

Location: Zhongshan, Guangdong









- Over 100 intersections deployed cumulatively
- Comprehensive detection of intersections and road segments
- Real-time simulation of traffic conditions
- Analysis of urban traffic flow

Cases-Situation Monitoring

Location: Harbin, Heilongjiang









- Over 300 intersections deployed cumulatively
- Stable collection of traffic data in high-cold environments
- Real-time simulation of intersection traffic conditions
- Analysis of urban traffic flow

Cases-Situation Monitoring

Location: Hezhe, Shandong







- To meet the smart transportation needs of Heze City, a city traffic situation monitoring system has been deployed at nearly 100 intersections.
- This system includes phased-array millimeter-wave radar, intelligent perception data platforms, and traffic guidance screens. It enables real-time collection and analysis of traffic flow data, supporting smart urban traffic management initiatives.

Cases-Situation Monitoring

Location: Dongying, Shandong





- Over 200 sets of equipment deployed cumulatively
- Traffic flow monitoring around the clock

Cases-Highway

Location: Dongying, Shandong









- Traffic volume: Up by 34.5%
- Number of congestions: Down by 65%
- Average congestion distance: Down by 33.3%
- Number of traffic accidents: Down by 77.3%

Cases-Highway

Location: Shanxi Highway



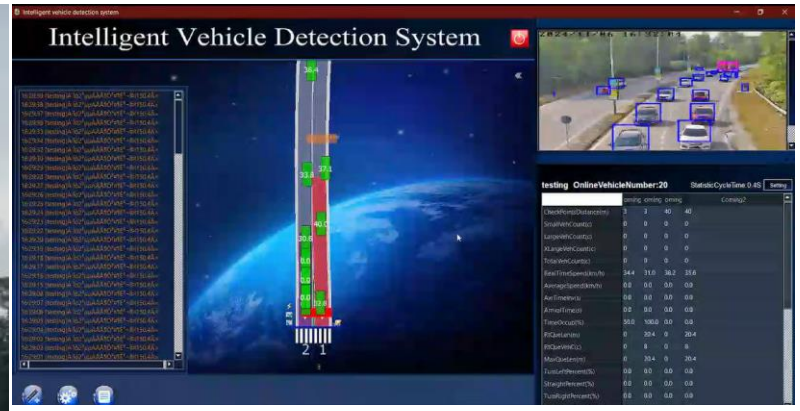
- Achieving continuous tracking of target trajectories, detecting traffic events in seconds, and analyzing traffic data, significantly enhancing the proactive detection and early warning capabilities of safety events on highway sections.

- To increase highway traffic capacity and alleviate congestion:
- Implement traffic event warning and location systems to reduce traffic accidents and secondary incidents.

Cases:
Highway Speed Limit & Flow Statistics

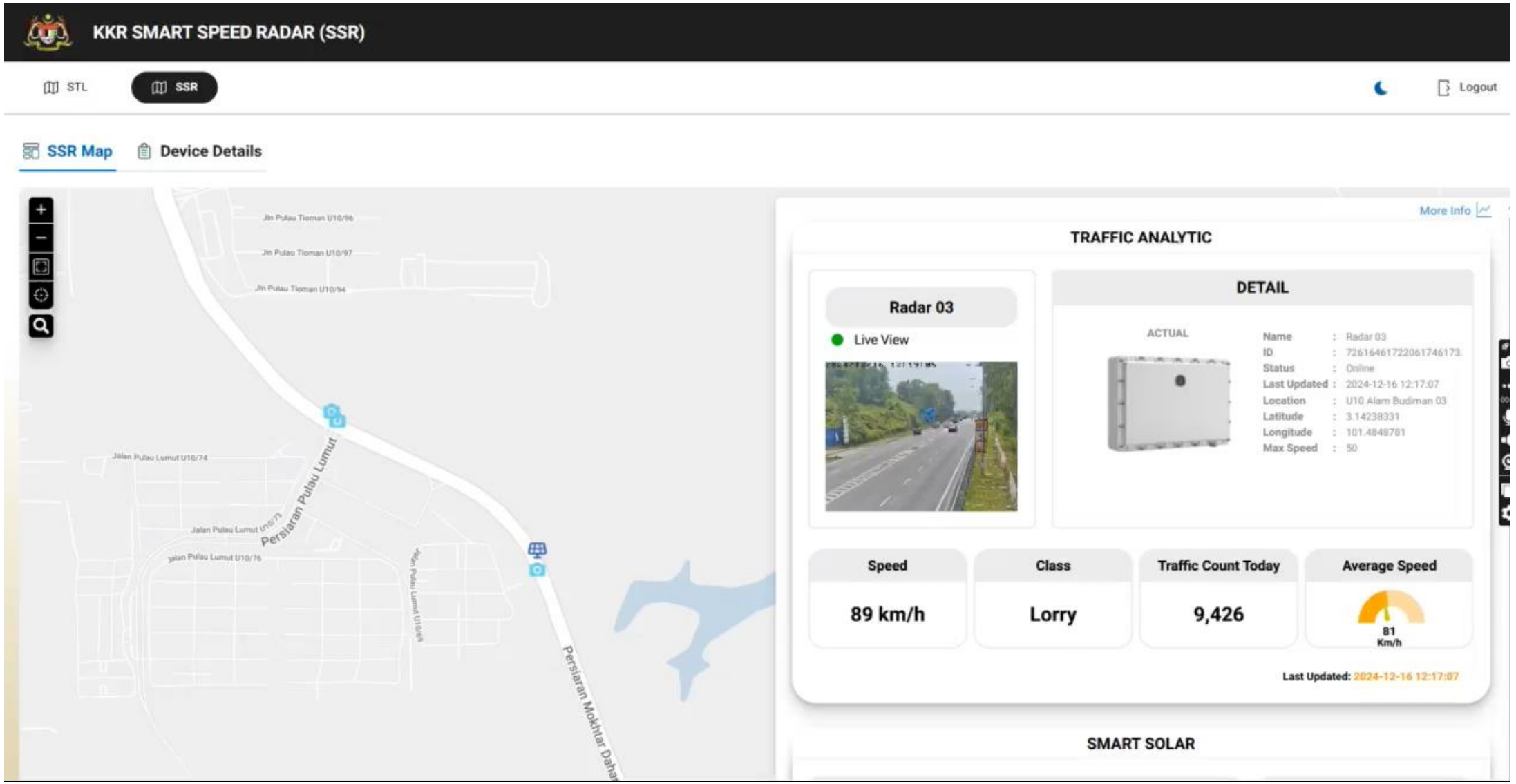
Location: Malaysia







- Speed limit with solar powered LED display
- Plate number of the vehicle which is over speed limit will be displayed on the LED.
- Up to 12 vehicle classifications can be identified precisely.
- Flow statistics for each of the vehicle classification can be displayed in the cloud platform.
- Cloud platform supports:
  - Overspeed records with vehicle plate number.
  - Onsite video stream is supported for each note.
  - Traffic flow statistics per each of the 12 vehicle classifications
  - Traffic status of one region or route


KKR SMART SPEED RADAR (SSR)
STL
SSR
Logout
SSR Map
Device Details
Jln Pulau Tioman U10/96
Jln Pulau Tioman U10/97
Jln Pulau Tioman U10/94
Jalan Pulau Lumut U10/74
Persiaran Pulau Lumut
Jalan Pulau Lumut U10/71
Jalan Pulau Lumut U10/76
Persiaran Mokhtar Dahar
More Info
TRAFFIC ANALYTIC
Radar 03
Live View
DETAIL
ACTUAL
Name : Radar 03
ID : 7261646172206174617 3
Status : Online
Last Updated : 2024-12-16 12:17:07
Location : U10 Alam Budiman 03
Latitude : 3.14238331
Longitude : 101.4848781
Max Speed : 50
Speed
89 km/h
Class
Lorry
Traffic Count Today
9,426
Average Speed
81
Km/h
Last Updated: 2024-12-16 12:17:07
SMART SOLAR

Cases-Tunnel

Location: Shanxi Highway Tunnel



- By integrating built-in algorithms, real-time detection of vehicle positions, speeds, and densities within tunnels is achieved. This enables continuous tracking of target trajectories, instant detection of traffic events, and analysis of traffic data, greatly enhancing proactive detection and warning capabilities for safety incidents.

- Integration with variable message signs and yellow guiding lights to warn society about the passage of hazardous material transportation vehicles through tunnels, thereby reducing the accident rate involving these vehicles.

Cases-V2X

Location: Deqing, Zhejiang



- Enables comprehensive collection of roadside traffic data, facilitating continuous tracking of target trajectories and instant detection of traffic events. This assistance aids the Deqing Vehicle-Road Cooperation Project in achieving interconnected traffic information among vehicles, roads, and people, as well as real-time traffic dynamics.
- Traffic trajectory monitoring: Tracking target positions and target travel trajectories.
- Traffic flow monitoring: Collecting data on points, lanes, and areas.

FAQ

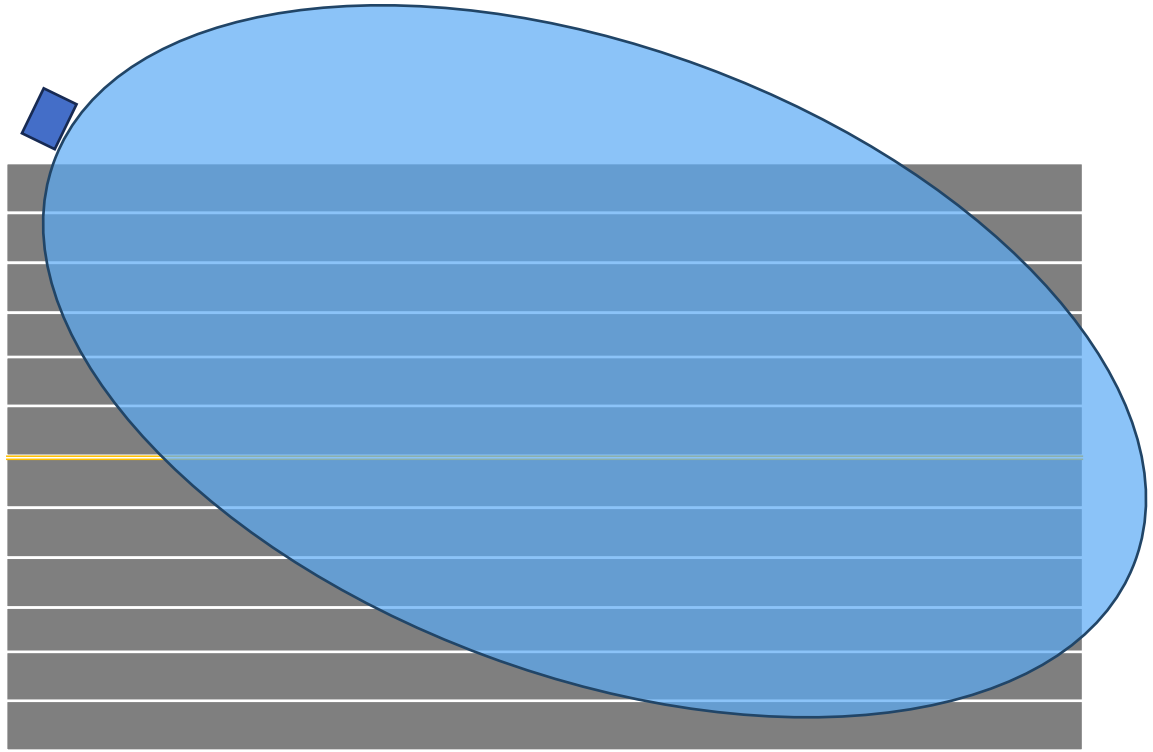
Why do ClairWav radars have high power consumption?

	T24L	T24LC	T24S	T24SC	T80L	T80LC
Power consumption (maximum)	25W	25W	18W	25W	25W	25W
Rated power consumption	20W	20W	11W	20W	20W	20W

ClairWav radars are forward-firing phased array microwave radars with ultra-long detection ranges of 250m to 400m. They support tracking up to 256 targets across 12 lanes and allow the definition of up to 64 cross-sections (such as measuring lines or virtual loops), with a maximum of 16 cross-sections per lane. Additionally, ClairWav radars integrate a video camera, combining the strengths of both radar and camera technologies. This advanced functionality is a key factor contributing to their power consumption.

FAQ

Can forward-firing radar be side mounted on highway application?



ClairWav radars can also be side-mounted to cover multiple lanes, although this configuration may reduce the detection distance along the highway's direction.

FAQ

Internal Data memory capacity ?

- Total 500Mb.
- 24 hours including trajectory data, flow data and all necessary operating data.
- > 90 days if only store flow data.

API

- We provide a standard API (communication protocol) for both sending data and receiving data.
- And we can also support customized API according to customer's request.

ERP (Effective Radiated Power)

- 13dbm

ClairWav Radar Detection Result Live Demo

TraffiClair

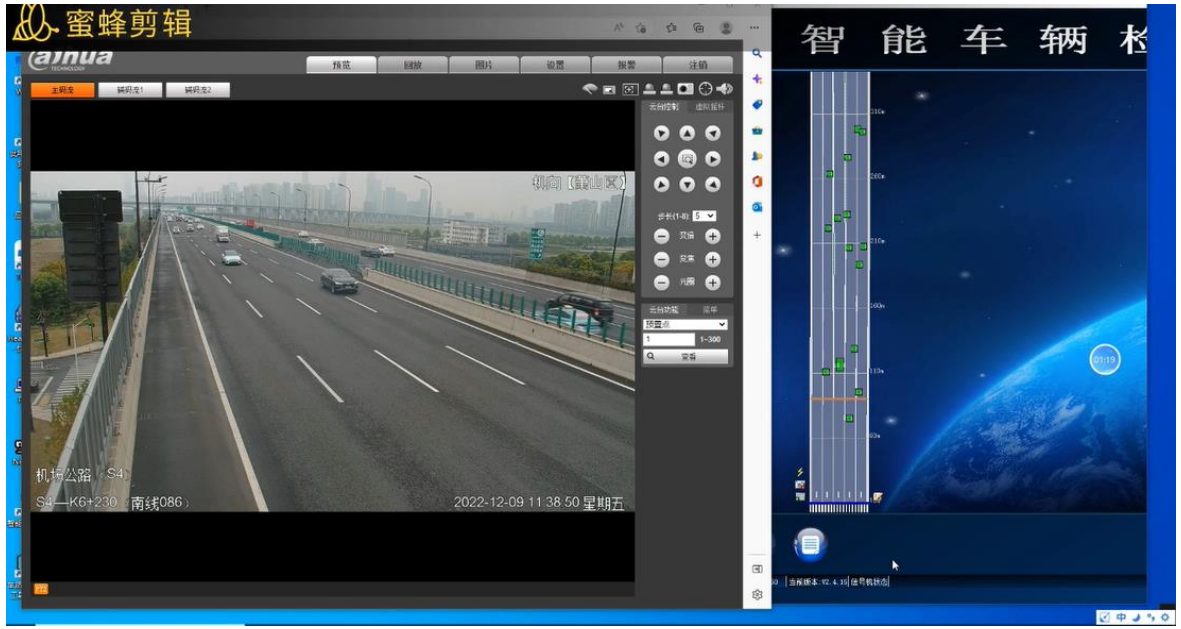
300m Straight Road (without Sound Barrier)



[View full video on Youtube]

Product webpage

300m Straight Road (with Sound Barrier)



[View full video on Youtube]

Product webpage

ClairWav Radar Detection Result Live Demo

TraffiClair

Highway Split Point



[View full video on Youtube]

Product webpage

Highway Merge Point



[View full video on Youtube]

Product webpage

ClairWav Radar Detection Result Live Demo

TraffiClair

Curved Road



[View full video on Youtube]

Product webpage

Straight road with road median strip with greenery



[View full video on Youtube]

Product webpage

ClairWav Radar Detection Result Live Demo

TraffiClair

Morning peak of an intersection



[View full video on Youtube]

Product webpage

Benchmark-Wavetronix

	WAVETRONIX					TRAFFICLAIR					Notes
Model	Smart Sensor V	Smart Sensor HD	Smart Sensor Matrix	Smart Sensor Advance	Smart Sensor Advance Extended Range	ClairWav-T24S	ClairWav-T24L	ClairWav-T24SC	ClairWav-T24LC	ClairWav-T77	
Type	Cross-Section Microwave - Single Beam	Cross-Section Microwave - Dual Beams	Area Radar - 16 beams (detecting in a 90-degree arc)	Road monitoring radar	Road monitoring radar	Phased array radar					Most of Wavetronix products are cross-section microwave radar, do not support multiple target as phased array radar.
Application scenario	Road segment	Road segment	Intersection	Intersection	Intersection/ Highway	Intersection/Highway					ClairWav can be widely used in both intersection and highway scenarios.
Detection distance	61m (200ft)	76m (250ft)	90°: 43m (140ft)	183m (600ft)	Truck: 275m (900ft) Car: 183m (600ft)	250m (820ft)	400m (1312ft)	250m (820ft)	400m (1312ft)	300m (984ft)	ClairWav supports longer distance
Simultaneously Detected Objects	Unknown	Unknown	Unknown	Unknown	Unknown	128	256	128	256	128	ClairWav supports multiple targets simutaninous detection.

Benchmark-Wavetronix

	WAVETRONIX					TRAFFICLAIR					Notes
Model	Smart Sensor V	Smart Sensor HD	Smart Sensor Matrix	Smart Sensor Advance	Smart Sensor Advance Extended Range	ClairWav-T24S	ClairWav-T24L	ClairWav-T24SC	ClairWav-T24LC	ClairWav-T77	
Video Camera	None	None	None	None	None	None	None	5megapixels	5megapixels	None	ClairWav models can support video camera integrates, which benefits much easier management.
Lanes	8 lanes	22 lanes	Multi-lane (support for curved, inclined lanes)			12 lanes (support for curved, inclined, tidal lanes, etc.)				8 lanes	
Data	Traffic volume, speed, occupancy rate.	Traffic volume, speed, occupancy rate, length, vehicle type classification.		Queue length, traffic volume, speed, occupancy rate, length, vehicle type classification, trajectory coordinates.		Traffic volume, average speed, vehicle types, occupancy rate, headway, queue length, saturation level, space occupancy rate, time occupancy rate, 85% percentile speed, maximum queue length, parking occurrences, delay time, latitude and longitude coordinates, target heading angle, instantaneous speed (velocity, acceleration) of the target, two-dimensional coordinates of the target, the lane in which the target is located, and target attributes such as length, width, height, type, and ID number.				Traffic flow, real-time speed/ average speed, presence, and queue length	ClairWav supports rich detection data.

Benchmark-Wavetronix

	WAVETRONIX					TRAFFICLAIR					Notes
Model	Smart Sensor V	Smart Sensor HD	Smart Sensor Matrix	Smart Sensor Advance	Smart Sensor Advance Extended Range	ClairWav-T24S	ClairWav-T24L	ClairWav-T24SC	ClairWav-T24LC	ClairWav-T77	
Events	None	Lane changing	Lane changing, illegal parking, etc.	Lane changing, illegal parking, wrong-way driving, etc.	Lane changing, illegal parking, wrong-way driving, etc.	Abnormal parking, wrong-way driving, lane changing, congestion, slow-moving traffic, over speeding, and under speeding. It is equipped to detect and alert authorities about instances such as queue limit exceeded and queue overflow				None	ClairWav supports rich events detection as well.
Installation and debugging	Convenient and remote					Convenient and remote					
Storage	Flash memory storage (upgradeable)					TF storage (upgradeable)				Flash memory storage	
Reliability	Not affected by temperature, light, and weather changes.					Not affected by temperature, light, and weather changes.					
Time synchronization	None	None	None	None	None	Supports GPS (BeiDou/GNSS) hardware time synchronization, capable of providing absolute timestamps with millisecond-level accuracy; supports NTP/PTP clock synchronization with millisecond-level precision.				None but expandable	ClairWav supports time synchronization through GPS/GNSS/Beidou.

Benchmark- SmartMicro

	SmartMicro				TraffiClair				
Model Parameters	TRUGRD UMRR-12 Type 48 (Typical Values at 12.7dBm)	TRUGRD UMRR-12 Type 48 (Typical Values at 20dBm)	UMRR-11 Type 45 (Typical Values at 12.7dBm)	UMRR-11 Type 45 (Typical Values at 20dBm)	ClairWav-T24S	ClairWav-T24L	ClairWav-T24SC	ClairWav-T24LC	Notes
Operating Frequency	24~24.25GHz	24~24.25GHz	24~24.25GHz	24~24.25GHz	24~24.25GHz	24~24.25GHz	24~24.25GHz	24~24.25GHz	
Lanes	12	12	4	4	12	12	12	12	
Simultaneously Detected Objects	256	256	126	126	128	256	128	256	
The horizontal field of view angle.	±55°	±55°	±22°	±22°	±45°	±45°	±45°	±45°	
The vertical field of view angle	±10°	±10°	±12°	±12°	±7°	±7°	±7°	±7°	
Maximum detection range for motor vehicles	Passenger car: 200m Truck: 300m	Passenger car: 260m Truck: 300m	190m	219m	250m	400m	250m	400m	Longer distance
Distance resolution	2m or 4m	2m or 4m	2.06m	2.06m	Long distance: 2m Short distance: 0.6m	Long distance: 2m Short distance: 0.6m	Long distance: 2m Short distance: 0.6m	Long distance: 2m Short distance: 0.6m	
Distance detection accuracy	±0.25 or ±0.5m	±0.25 or ±0.5m	±0.25m	±0.25m	Long distance: ±0.4m Short distance: ±0.1m	Long distance: ±0.4m Short distance: ±0.1m	Long distance: ±0.4m Short distance: ±0.1m	Long distance: ±0.4m Short distance: ±0.1m	
Speed detection range	±210km/h or ±320km/h	±210km/h or ±320km/h	±320km/h	±320km/h	-220~+220km/h	-220~+220km/h	-220~+220km/h	-220~+220km/h	
Speed resolution	0.23m/s or 0.78m/s	0.23m/s or 0.78m/s	0.35m/s	0.35m/s	0.1m/s	0.1m/s	0.1m/s	0.1m/s	Higher speed resolution.
Speed detection accuracy	±0.1m/s or ±0.28m/s	±0.1m/s or ±0.28m/s	±0.18m/s	±0.18m/s	±0.05m/s	±0.05m/s	±0.05m/s	±0.05m/s	Higher speed detection accuracy
Angular resolution	6°	6°	1°	1°	3°	2°	3°	2°	
Angular measurement accuracy	0.5°	0.5°	20°	20°	±0.2°	±0.1°	±0.05°	±0.05°	Higher angular measurement accuracy
Operating/storage temperature	-40℃~+80℃	-40℃~+80℃	-40℃~+85℃	-40℃~+85℃	-40℃~+74℃ (Operating temperature) -45℃~+85℃ (Storage temperature)	-40℃~+74℃ (Operating temperature) -45℃~+85℃ (Storage temperature)	-40℃~+74℃ (Operating temperature) -45℃~+85℃ (Storage temperature)	-40℃~+74℃ (Operating temperature) -45℃~+85℃ (Storage temperature)	
IP Class	IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67	
Acceleration	No	No	No	No	Yes	Yes	Yes	Yes	more suitable for abnormal drivinging & breaking detection
Cycle Time	50ms, 100ms	50ms, 100ms	58ms, 75ms	58ms, 75ms	50ms, 100ms	50ms, 100ms	50ms, 100ms	50ms, 100ms	
Power/Ethernet disconnected counting	?	?	?	?	Yes	Yes	Yes	Yes	easier to troubleshooting （monitoring software needed）
Number of Simultaneously Counting Bars	?	?	?	?	32	32	32	32	
Build-in Camera	No	No	No	No	No	No	Yes	Yes	5MP, 25fps
license plate recognition	No	No	No	No	No	No	Yes	Yes	Need further training for US plate number.
Vehicle Types Classification	No	No	No	No	3	3	12	12	Rich vehicle classification
Frequency Points for Anti-interference	No	No	No	No	6	6	6	6	

TraffiClair

Benchmark-RTMS ECHO (Sensys)

Model Name	RTMS ECHO	ClairWav-T24	ClairWav-T80	Notes
Type	The RTMS Echo is a side fire radar mounted on the roadside. K band, model Echo operates at high resolution in the 24 GHz band	24GHz Phased array traffic radar	80GHz Phased array traffic radar	Forward installation (also support side mounting), managing multiple lanes, providing data per each lane.
Application	Urban Road/Highway	Urban Road/Highway	Urban Road/Highway	
Detection Distance	76m	250-400m	350m	Much longer distance. Higher accuracy for the detection of extra long queue. Can follow the vehicle for much longer distance as well.
Detection Targets	Do not support multiple targets	256	256	Multiple targets
The horizontal field of view angle	78°	90°	90°	Wide angle
Maximum cross section count	Should be 1 only	64	64	Support maximum 64 cross-section count, this is the big advantage of forward installed radar compared with side fire radar.
Maximum cross section count per lane	Should be 1 only	16	16	Each lane can support max 16 cross-section count.
Vehicle Trajectory	Do not support.	Support	Support	Vehicle trajectory data will be important for applications like V2X
Data	Volume and Occupancy · Classification counts · Gap and Headway · Vehicle speed bins (8) · Average speed · 85th percentile speed · Per-vehicle records · Sensor voltage · Length-based classification bins (8)	Traffic flow, average speed, vehicle type, occupancy rate, headway, queue length, saturation, space occupancy rate, time occupancy rate, 85th percentile speed, maximum queue length, number of stops, delay time, latitude and longitude coordinates, target heading angle, target instantaneous velocity (speed, acceleration), target two-dimensional coordinates, target lane, target attributes (length, width, height, type, ID number).	Traffic flow, average speed, vehicle type, occupancy rate, headway, queue length, saturation, space occupancy rate, time occupancy rate, 85th percentile speed, maximum queue length, number of stops, delay time, latitude and longitude coordinates, target heading angle, target instantaneous velocity (speed, acceleration), target two-dimensional coordinates, target lane, target attributes (length, width, height, type, ID number).	Rich data
Pedestrian, non-motor vehicle	Support	Support	Support	
Operating Temperature	- 40℃ ~ +74℃	- 40℃ ~ +74℃	- 40℃ ~ +74℃	
IP Class	IP67	IP67	IP67	
Dimension	320 x 180 x 70 mm	210*154*58mm	210*154*58mm	Small size
Weight	1.5Kg	2Kg	2Kg	
Power Supply	12-24 Volts DC	DC24V(DC+21.6V ~ 32V)	DC24V(DC+21.6V ~ 32V)	
Operating Frequency	24.5-24.25 GHz (K band)	24-24.25 GHz (K band)	80GHz	Multiple choices
Interface	Ethernet 100Mbps	Ethernet（RJ45 100Mbps）	Ethernet（RJ45 100Mbps）	
MTBF	10 years	10 years	10 years	
Installation	Easy	Easy	Easy	

TraffiClair

Benchmark-Econolite

Model Name	EVO RADAR	ClairWav-T24	ClairWav-T80	Notes
Type	MIMO (Multiple Input Multiple Output) regional radar system, similar to regional security radar, can simultaneously cover two directions, requiring only two installations per intersection. However will need to install dedicated poles and the accuracy will be affected by trees and so on.	24GHz Phased array traffic radar	80GHz Phased array traffic radar	Forward installation, managing multiple lanes, providing data per each lane. Do not need to install dedicated pole.
Application	Intersection	Intersection/highway	Intersection/highway	Wide application scenarios
Detection Distance	274m（900feet）	250-400m	350m	Longer distance
Detection Targets	512	256	256	
The horizontal field of view angle	110°	90°	90°	Small angel but longer view
Data	Flow, speed, type, arrival time	Traffic flow, average speed, vehicle type, occupancy rate, headway, queue length, saturation, space occupancy rate, time occupancy rate, 85th percentile speed, maximum queue length, number of stops, delay time, latitude and longitude coordinates, target heading angle, target instantaneous velocity (speed, acceleration), target two-dimensional coordinates, target lane, target attributes (length, width, height, type, ID number).	Traffic flow, average speed, vehicle type, occupancy rate, headway, queue length, saturation, space occupancy rate, time occupancy rate, 85th percentile speed, maximum queue length, number of stops, delay time, latitude and longitude coordinates, target heading angle, target instantaneous velocity (speed, acceleration), target two-dimensional coordinates, target lane, target attributes (length, width, height, type, ID number).	Rich data
Pedestrian, non-motor vehicle	Support	Support	Support	
Operating Temperature	- 40℃ ~ +74℃	- 40℃ ~ +74℃	- 40℃ ~ +74℃	
IP Class	IP67	IP67	IP67	
Dimension	308*136*71mm	210*154*58mm	210*154*58mm	Small size
Weight	2.5Kg（5.5 ibs）	2Kg	2Kg	
Power Supply	20-28 VDC 36 W @ 20℃	DC24V(DC+21.6V ~ 32V)	DC24V(DC+21.6V ~ 32V)	
Operating Frequency	24.5-24.25 GHz (K band)	24-24.25 GHz (K band)	80GHz	Multiple choices
Interface	Ethernet 100Mbps	Ethernet（RJ45 100Mbps）	Ethernet（RJ45 100Mbps）	
Lifespan	3-year	10-year	10-year	Longer lifespan
Installation	Easy	Easy	Easy	

TraffiClair

Thanks