AI-enabled Preventive Grid Analytics

Fault Detection & Location

Preventive Analysis

Lower Maintenance Costs

Improved Grid Reliability and Safety

InHand Networks

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IWOS: Line Sensor + Concentrator +AI Analytics Platform

System Components

Line Sensor

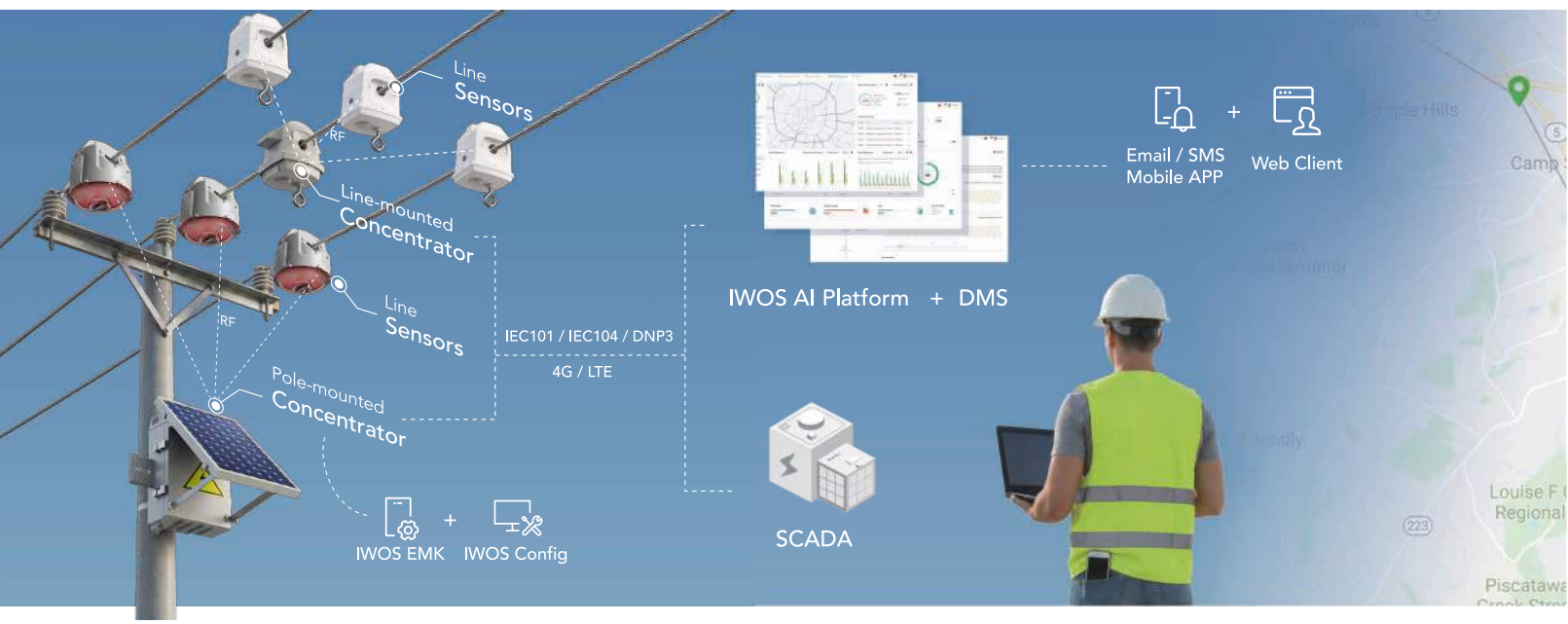
+ Compatible with **50/60Hz** grids
+ High precision current measurement: **0~100A, ±0.5A; 100A~630A, ±0.5%**
+ High sampling rate of oscillography waveforms: **12.8/15.36kHz** (256 samples/cycle)
+ Zero-sequence current synthesis enabled by **10μs** precision sync
+ Power optimization operation
  - Full-function mode: all functions including waveform recording enabled; powered by line and supercapacitor
  - Low-power mode: waveform recording disabled; powered by line and battery
+ Power harvesting: **1A or photovoltaic solar energy** to support full-function mode; supercapacitor backs for 12h
+ IP67, water proof
+ Light weight: <1.5kg, live installation and removal

Concentrator

+ WAN: **LTE&LoRa WAN**
+ Field Area Network: Sub-1G short range radio
+ High-Precision (1μs) GPS for location and time synchronization
+ Fault detection based on zero-sequence current synthesis
+ Main and backup power: Line harvesting (solar), maintenance-free capacitor
+ IP67(IP55) protection
+ Remote upgrade & maintenance

AI Analytics Platform

+ Sensor and concentrator management
+ GIS-based real-time monitoring of line status and events
+ Deep learning analytic system
  - Oscillography waveform classification powered by **AI algorithms**
  - Accurate fault location and Email/SMS/Mobile APP alarms
  - **Preventive analysis** and early warning
+ **Flow Direction & Load Analysis**
+ Reports
  - Load trend & statistics
  - Power quality analysis
  - Fault statistics



IWOS: Line Sensor + Concentrator +AI Analytics Platform

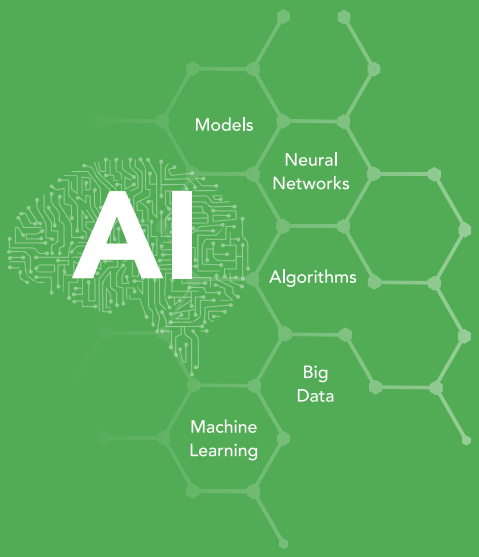
Installed **Equipment**	Covered **Line**	Covered **Substation**	Collected **Fault Recording Data**	Detected **Line Failure**
150,000+	32,000+	5,000+	400 Million+	460,000+

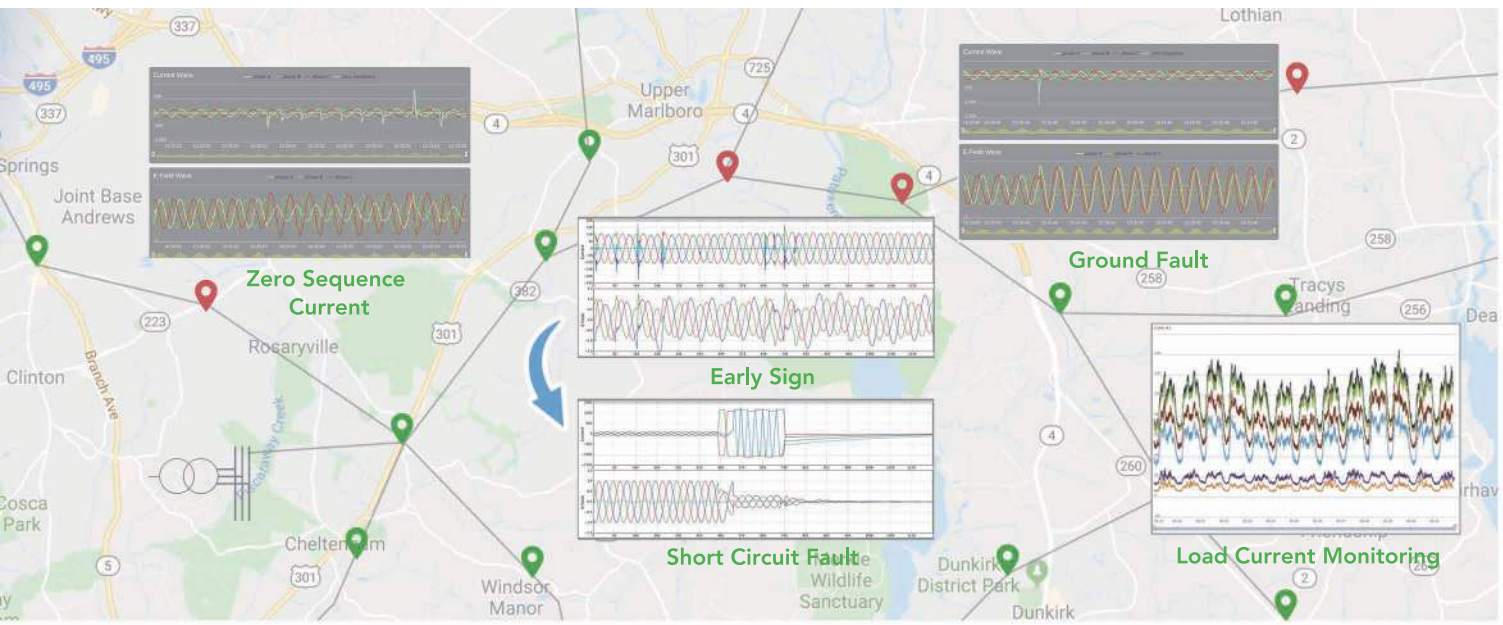


90% accuracy

- Ground Fault ← Classifier 1
- Short Circuit Fault ← Classifier 2
- Inrush Current ← Classifier 3
- Lightning ← Classifier 4
- Power Restore ← Classifier 5
- Power Outage ← Classifier 6
- Other Events

Preventive Alerts





Model Nomenclature

IWOS Line Sensor

Overhead Line Sensor Model	Model code: IWO-C-<C/E/U/M><5/6><A/L/S>		
	<C/E/U/M>:Short-range Frequency	<5/6>: Line Frequency	<A/L/S>: Version
IWO-C-<C/E/U/M><5/6><A/L/S>	C: 470-510MHz E: 433.05-434.79 MHz U: 915-928MHz M: 863MHz-868MHz	5: 50Hz 6: 60Hz	A: AI - 1A Power Harvesting L: LT - 3A Power Harvesting S: SE - Solar Energy
Example:	IWO-C-C6A: overhead line sensor, short-range communication frequency is 470-510MHz, applicable to 60Hz 10KV power lines.		

IWOS Concentrator - Pole-mounted / Line-mounted

Concentrator Model	Model code: IWO-HD/HX-<WMNN>-<C/U/M/E><5/6><A/B/C/D/E/F><2/3/N>				
	<WMNN>: Cellular Type & Module	<C/U/M/E>: Short-range Frequency	<5/6>: Line Frequency	<A/B/C/D/E/F>: Battery	<2/3/N>: Solar Power
IWO-HD/HX-<TL00>-<C/U/M/E><5/6><A/B/C/D/E/F><2/3/N>	China - LTE CAT4: LTE-FDD B1/B3/B5/B8 LTE-TDD B38/B39/B40/B41 TD-SCDMA B34/B39 UMTS(DC-HSPA+) B1/B5 GSM: B2/B3/B5/B8	C: 470-510MHz U: 915-928MHz M: 863-868MHz E: 433.05-434.79MHz	5: 50Hz 6: 60Hz	A: 7.2Ah Lead-acid B: 12Ah Lead-acid C: 40Ah Li-phosphate D: 40Ah Gel E: 12Ah Li-phosphate F: 3.3Ah Li-phosphate	2: 20W 3: 30W N: No solar power
IWO-HD/HX-<LQ25>-<C/U/M/E><5/6><A/B/C/D/E/F><2/3/N>	Europe, Middle East, Africa, South Korea, Thailand, India - LTE CAT4: LTE FDD: B1/B3/B7/B8/B20/B28A WCDMA: B1/B8 GSM: B3/B8				
IWO-HD/HX-<FQ78>-<C/U/M/E><5/6><A/B/C/D/E/F><2/3/N>	Australia, New Zealand, Taiwan, Latin America - LTE CAT4: LTE FDD: B1/B2/B3/B4/B5/B7/B8/B28 LTE TDD: B40 WCDMA: B1/B2/B5/B8 GSM: B2/B3/B5/B8				
IWO-HD/HX-<FQ13>-<C/U/M/E><5/6><A/B/C/D/E/F><2/3/N>	North America, AT&T, T-Mobile - LTE CAT1: LTE-FDD Band2/4/12				
IWO-HD/HX-<FQ58>-<C/U/M/E><5/6><A/B/C/D/E/F><2/3/N>	EMEA、South Korea、Thailand、India- LTE CAT4: LTE FDD: B1/B3/B5/B7/B8/B20 LTE TDD: B38/B40/B41 WCDMA: B1/B5/B8 GSM: B3/B8				
Example:	IWO-HD-LQ25-C5B2: Concentrator, pole-mounted, supports Europe and Asia Pacific networks, short-range communication frequency is 470-510MHz, applicable to 50Hz 10KV power lines, packaged with 12Ah lead-acid battery, 20W solar panel.				

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