

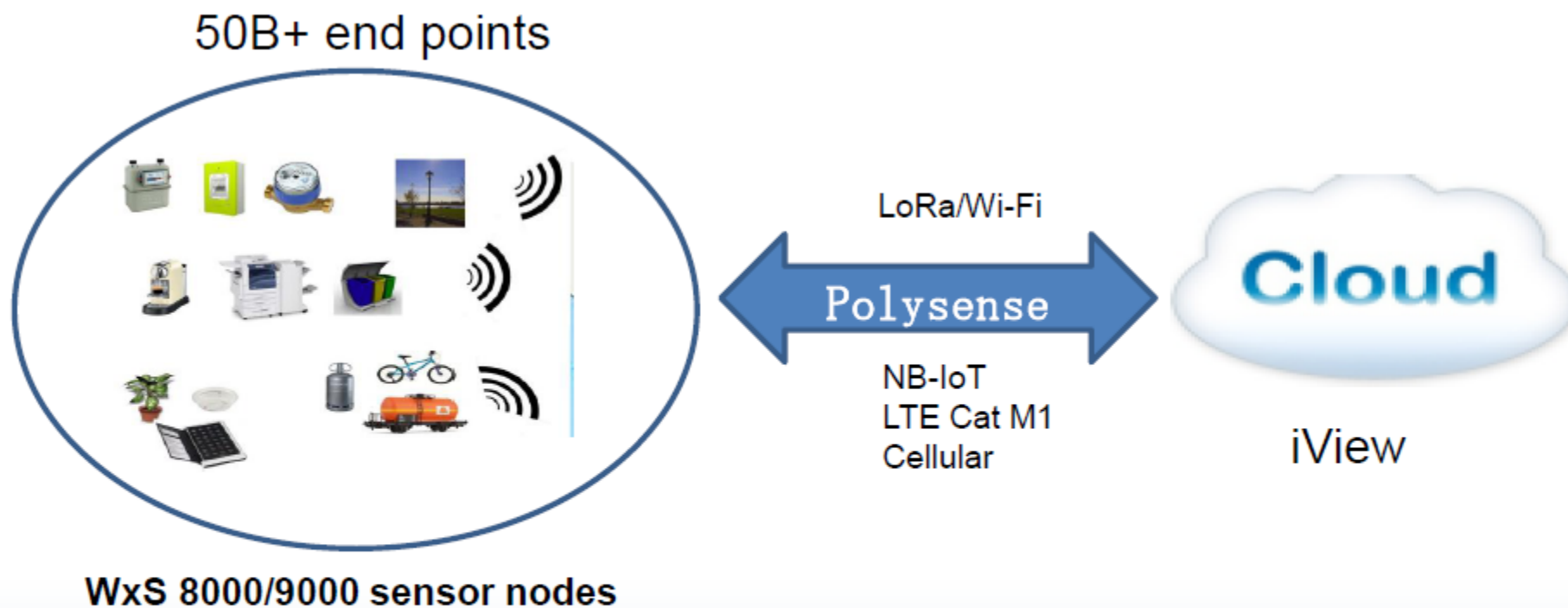
# Polysense Technologies

## Connecting & Sensing the World



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[www.Polysense.net](http://www.Polysense.net)

**Silicon Valley/Beijing/Shanghai/Henan**



**Wirelessly bridging the cloud and objects  
any sensor, any where, any time**

在任何地点，任何时间，无线连接云和任何传感器

## Universal Sensing Solution with Distributed Data Analytic for IoT



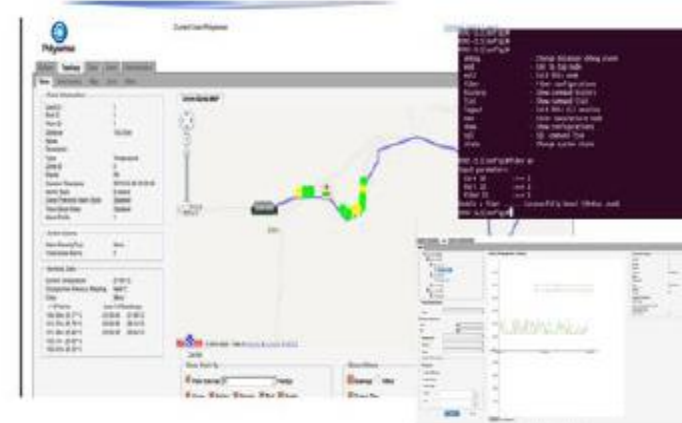
WxS 8x00/6x00  
LPWAN (LoRa) Wireless Sensing

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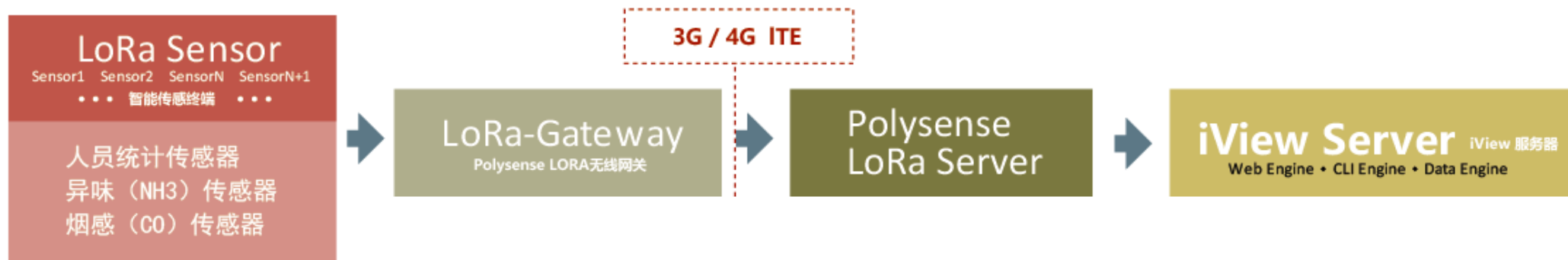
WxS 9x00/7x00  
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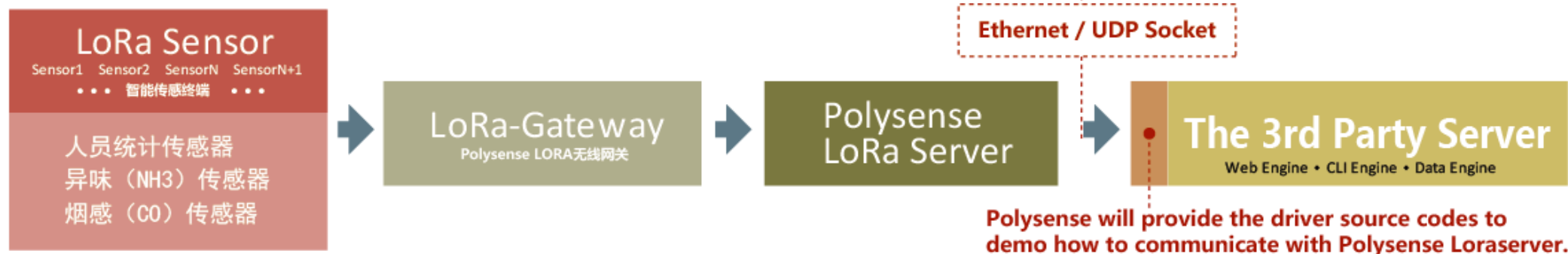


iView  
Cloud data management  
platform

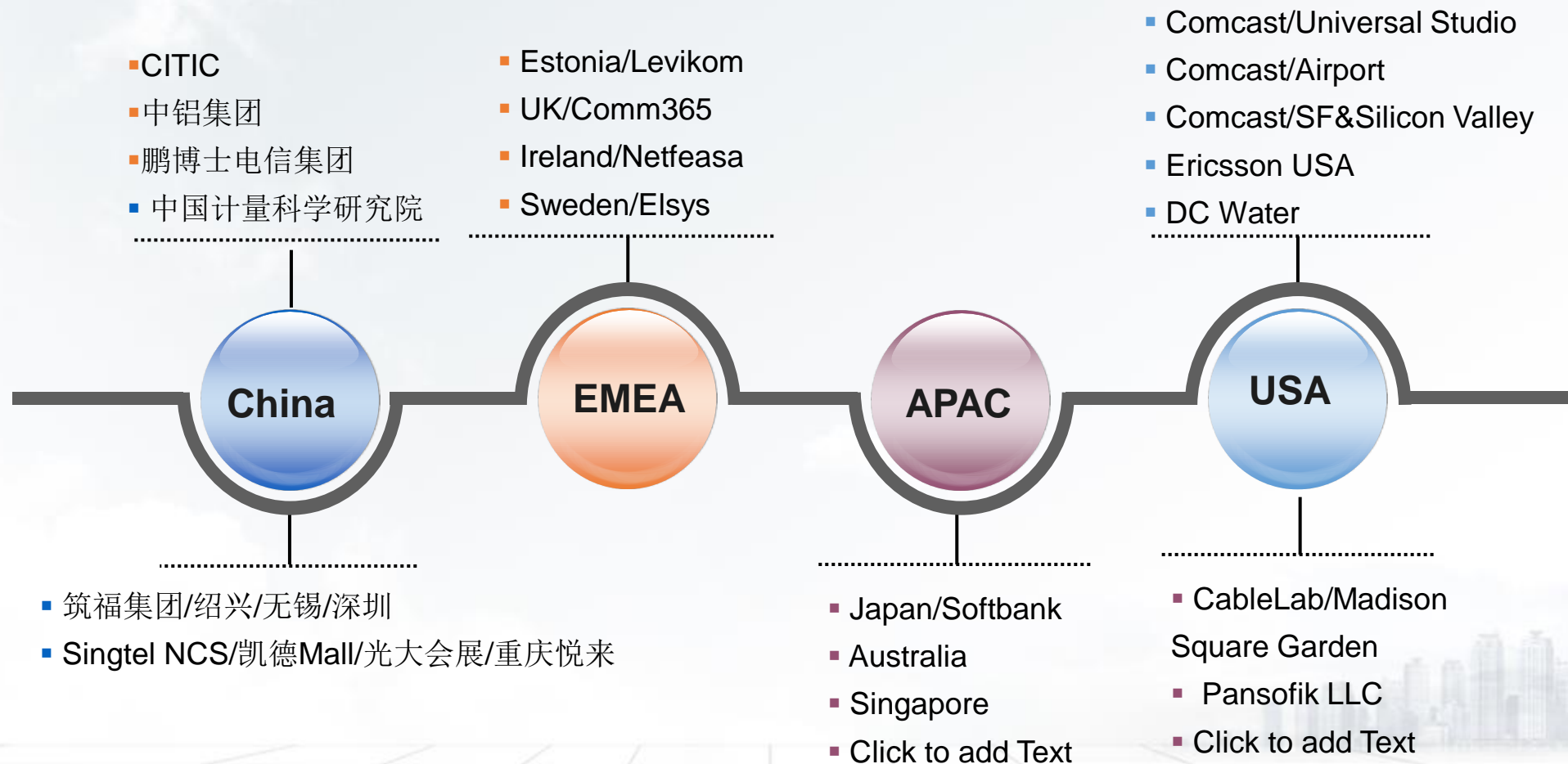
iView  
Cloud data management  
platform



Connection method 1



Connection method 2





WxS系列

# $\beta$ -ray tarry dust monitoring



博立信科技  
POLYSENSE



New Zealand is rich in non-metallic mineral resources including coal, amorphous silica, bentonite, diatomaceous earth, dolomite, iron ore, limestone, perlite, pumice, high grade silica sand, zeolites and different types of clay. These resources underpin New Zealand's industrial, construction and agricultural production.

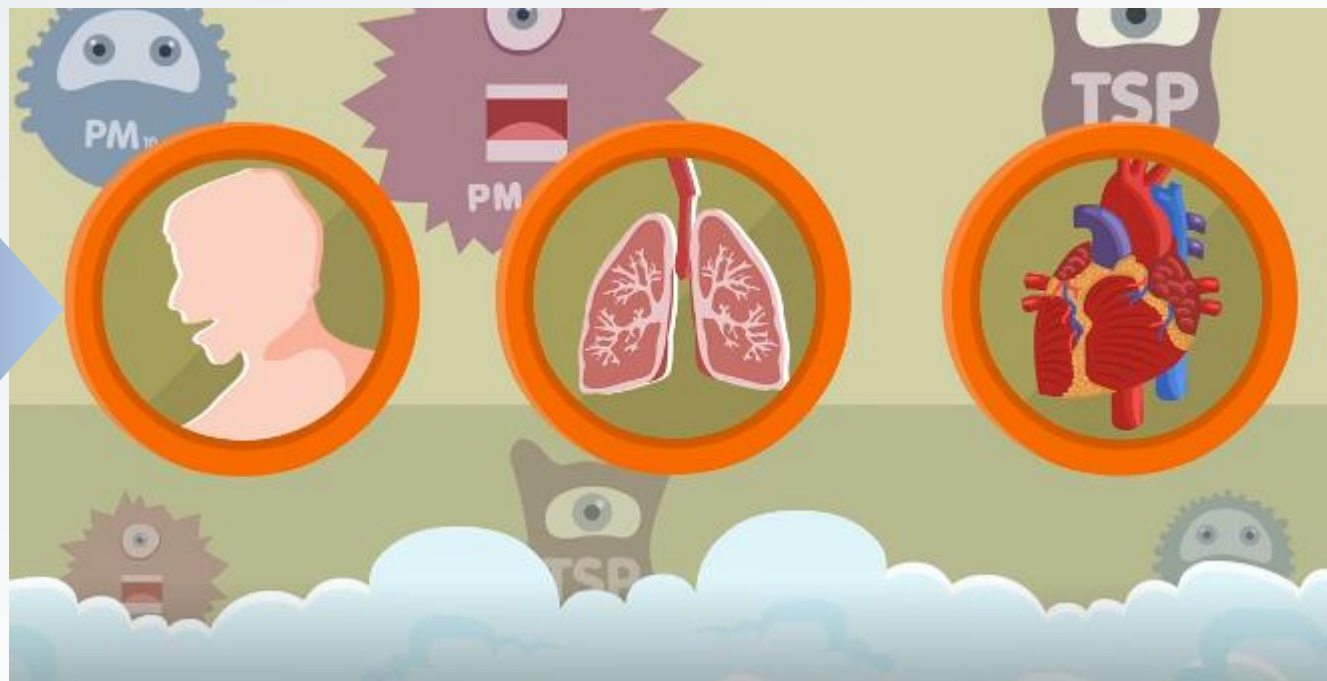
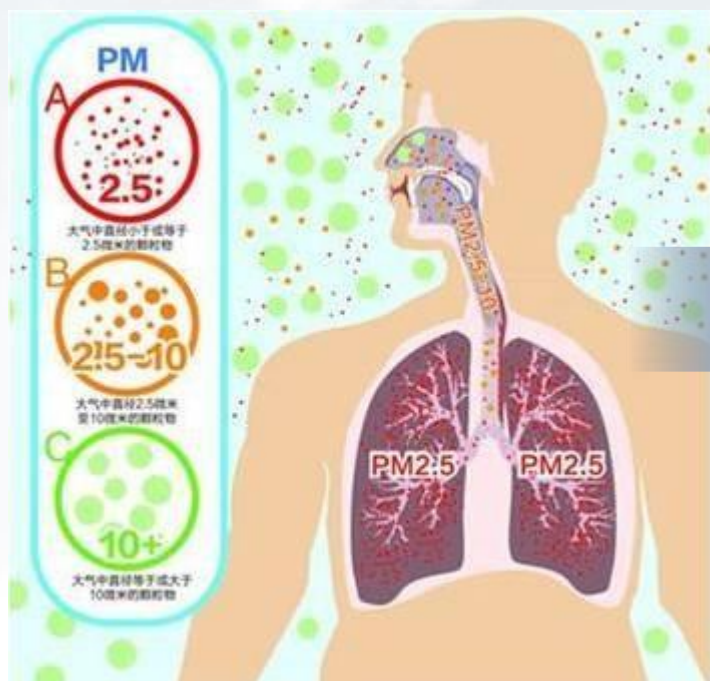




In the production process of quarry, the main dust generated mainly has the following reasons:

- (1) Unorganized dust emissions from quarries.
- (2) Dust is generated during the crushing process.
- (3) Dust in the yard.
- (4) Dust during the charging process.
- (5) The dust of the road.





When the TSP diameter is less than 2.5um, it is called the lung particles. And carrying a large amount of industrial substances accumulated in the alveoli for a long time. Form diseases such as asthma, lung cancer, and cardiovascular disease.

The World Health Organization (WHO) believes that the pm2.5 standard value is less than 10 micrograms per cubic meter. When the annual average concentration reaches 35 micrograms per cubic meter, the chances of illness and death are greatly increased.



世界卫生组织 (WHO) 2005年《空气质量准则》

项目	年均值	日均值
准则值	10 $\mu\text{g}/\text{m}^3$	25 $\mu\text{g}/\text{m}^3$
过渡期目标1	35 $\mu\text{g}/\text{m}^3$	75 $\mu\text{g}/\text{m}^3$
过渡期目标2	25 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$
过渡期目标3	15 $\mu\text{g}/\text{m}^3$	37.5 $\mu\text{g}/\text{m}^3$

Subject to WHO data, the pm2.5 international standards are

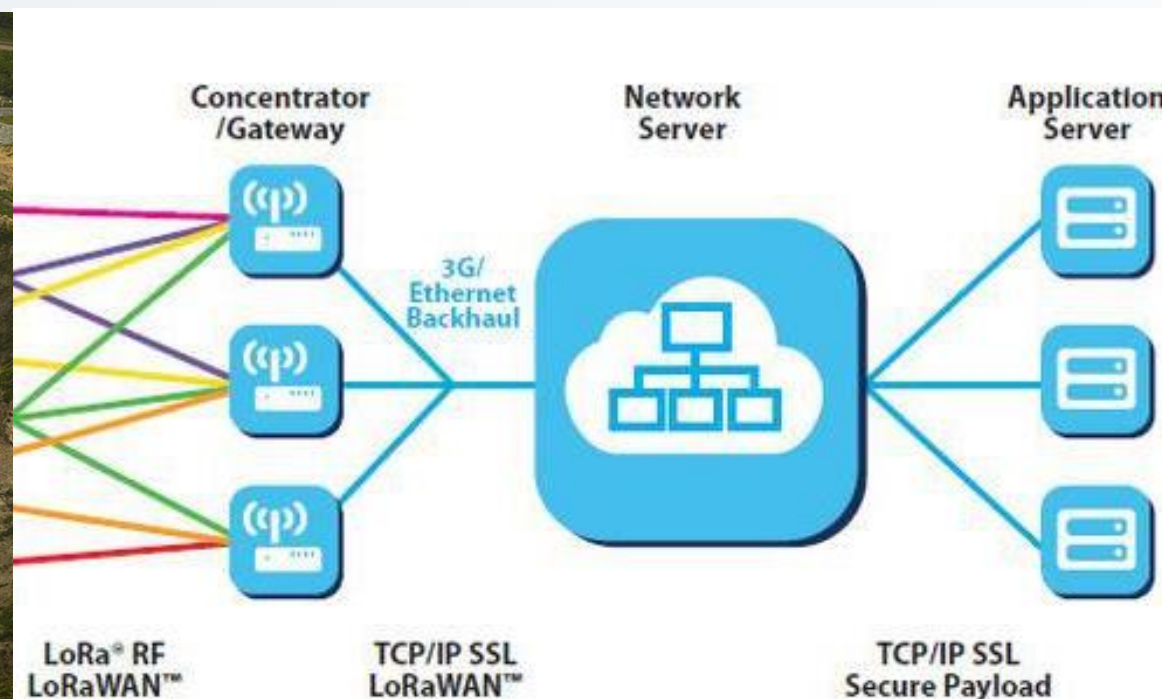
Transitional goal 1 – 24 hours < 75 micrograms;

Transitional goal 2 – 24 hours < 50 micrograms;

Transitional goal 3 – 24 hours < 37.5 micrograms;

The final standard is – 24 hours < 25 micrograms;





Communication networking mode LORAWAN:

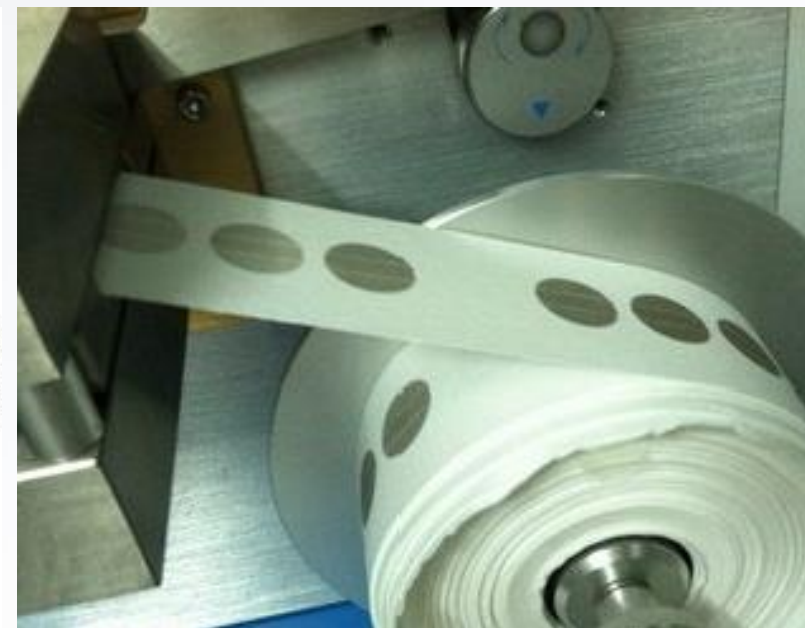
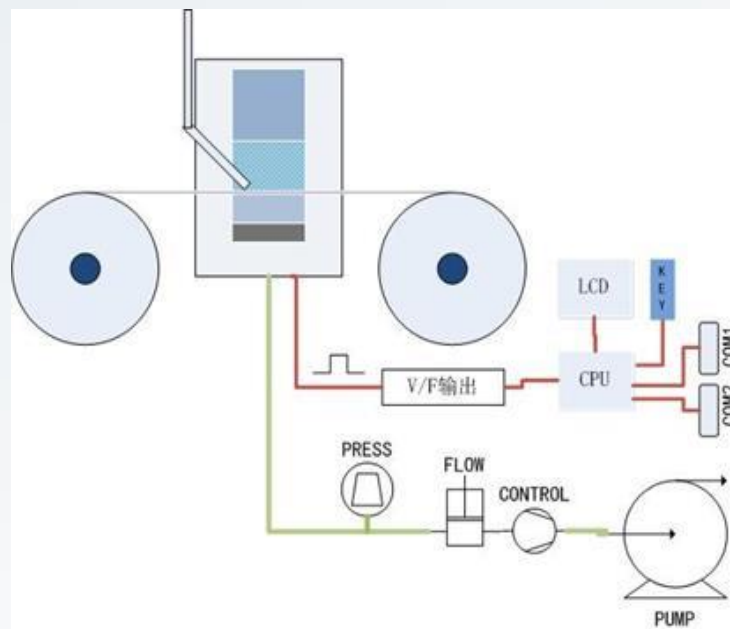
Considering the construction and coverage of the sensor terminal away from the cellular network, in order to ensure the stability of the communication capability, it is recommended to use the LORAWAN networking mode.





## Beta ray dust concentration monitor

The principle of  $\beta$ -ray attenuation adsorption is adopted. The concentration of dust is measured by measuring the amount of radiation absorbed by atmospheric dust. The more the amount of ray absorbed, the higher the concentration of dust, and the less the amount of ray absorbed; on the contrary, the lower the concentration of dust.



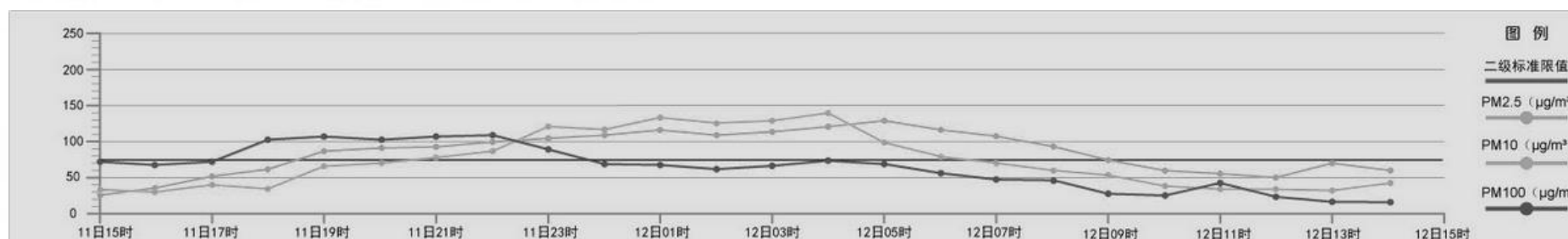
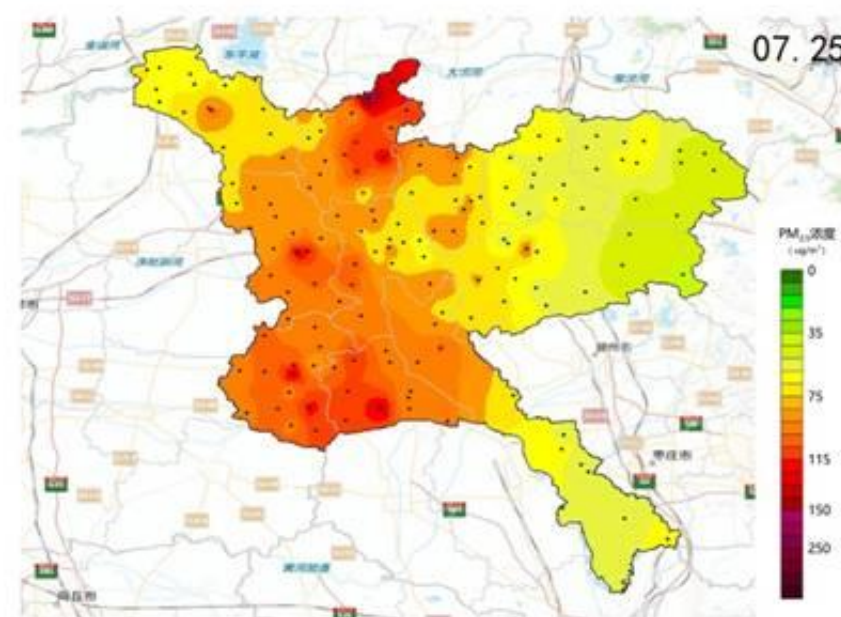
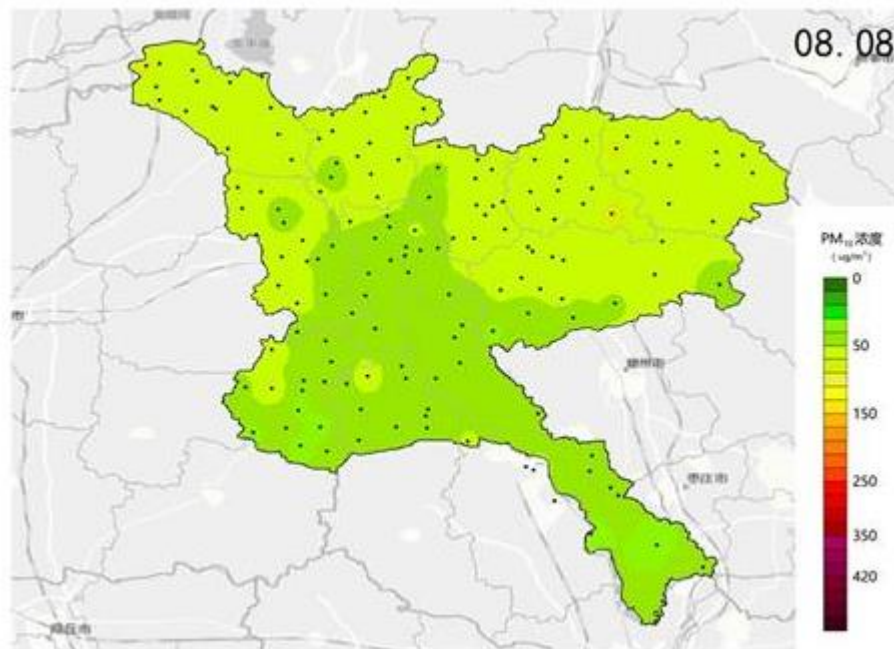
## Principle of beta ray concentration monitoring

Beta ray is a high-speed electron flow that, when it penetrates a substance, is partially absorbed, causing the intensity to decay. Under certain conditions, the amount of attenuation is only related to the mass of the absorbing material, and is independent of other physicochemical properties of the absorbing material (such as dust dispersion, color, gloss, shape, etc.), so it can directly measure the mass concentration of atmospheric dust.



project	性能指标
Measuring range	(0-1000) $\mu\text{g}/\text{m}^3$ 、(0-10000) $\mu\text{g}/\text{m}^3$ optional
Measurement accuracy	$\pm 2\%$
Full mark value	$1.5\text{mg}/\text{cm}^2$
Spot area	$1\text{cm}^2$
Center distance between spots	$\alpha \pm 0.5\text{mm}$ ,
Minimum detection limit	$\leq 2\mu\text{g}/\text{m}^3$
Pre-metering temperature	$-30^\circ\text{C} \sim +50^\circ\text{C}$ , $\pm 0.5^\circ\text{C}$ 。
Pre-measurement pressure	$60\text{kPa} \sim 110\text{kPa}$ , Indication error $\pm 2.5\%$ 。
Reproducibility	$\leq 2\%$
Instrument parallelism	$\leq \pm 15\%$
Sampling flow deviation	$\pm 2\%$ (Constant flow $16.7\text{L}/\text{min}$ )
Timing error	$24\text{h} < 10\text{s}$
Machine noise	$\leq 65\text{dB}$





**Multi-point distributed monitoring:** It can display the pollution distribution of the whole area globally, and can observe and analyze the pollution development area.



### Laser scattering to monitor dust for distributed monitoring:

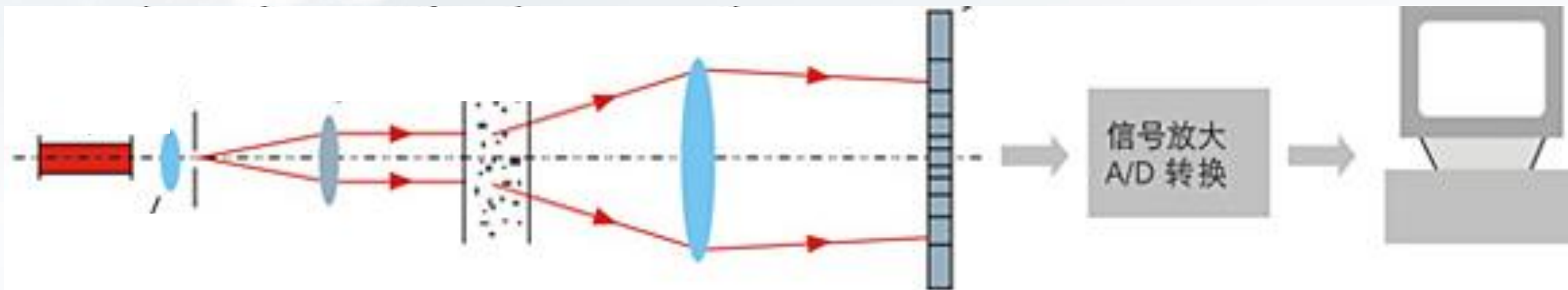
Since the dust monitoring of beta rays is too expensive, it is not economical for a large amount of distributed monitoring. It is recommended to use a laser scattering method to achieve distributed overall monitoring.

Detection principle: light scattering principle;

resolution: 0.1ug/m<sup>3</sup>;

Particle size channel: PM2.5, PM10, TSP;

Detection range: 0 ~ 40mg / m<sup>3</sup>;



### Laser scattering method:

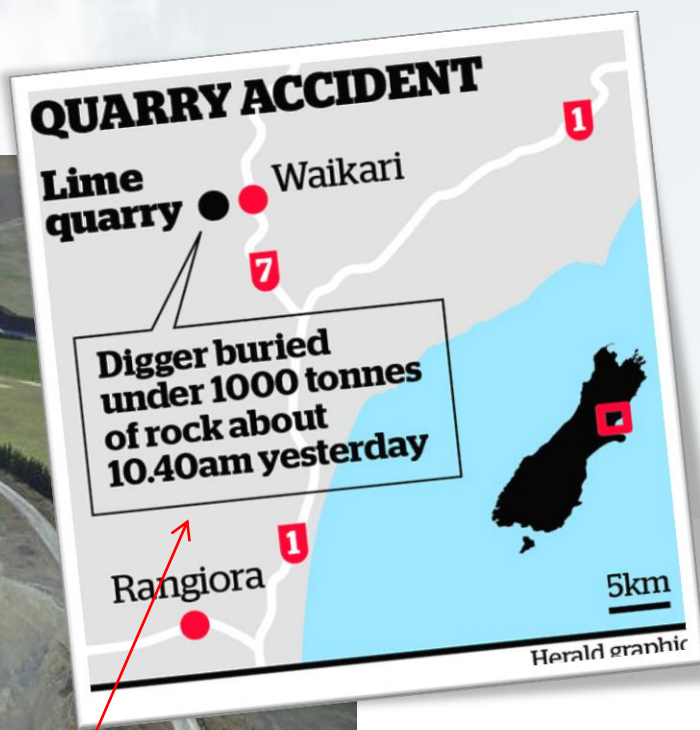
When the particles pass through the photosensitive region formed by the focused laser, the light scattered by the particles is collected by the microphotodetectors on the detection window. The microphotodetector converts the received light intensity signal into a corresponding voltage signal quickly and accurately. The intensity of the signal corresponds to the unit concentration value of the particle, and the dust concentration value is converted into a coefficient and outputted in real time through the data interface.





The laser scattering dust tester has abundant environmental indicators. Meet the many requirements of environmental monitoring.

project	purpose	指标
Particle sensor	PM dust pollution	Detection principle: light scattering principle; resolution: 0.1ug/m <sup>3</sup> ; Particle size channel: PM2.5, PM10, TSP; Detection range: 0 ~ 40mg / m <sup>3</sup> ;
Ambient noise sensor	Blasting noise pollution	Measuring range: 30-130dB; sampling rate: 48k/s high-speed sampling;
Wind speed and direction sensor	Pollution distribution trend analysis	Wind speed: range: 0~45m/s; resolution: 0.1m/s; Accuracy: ±0.3m/s; starting wind speed: ≤0.5m/s;
		Wind direction: range: 0-360°; resolution: 1 ° C; Accuracy: ±3 ° C; starting wind speed: ≤ 0.5 m / s;
Temperature and humidity sensor	Climate reference	Temperature: range: -40 ~ 120 ° C; resolution: 0.1 ° C; Accuracy: ±0.3 ° C;
		Humidity: range: 0 ~ 100% RH; resolution: 0.1% RH; Accuracy: ± 2% RH;
Atmospheric pressure sensor	purpose	Range: 10~1100hPa; Resolution: 0.1hPa Accuracy: ±0.3hPa



## Slope structure monitoring:

Polysense provides complete slope state structure monitoring. Online monitoring of structural crack propagation, slope sliding displacement, rainfall statistics, and geological moisture content. Prevent the slope from deteriorating and cause irreparable accidents.







THANKS FOR YOUR ATTENTION  
w y u @ p o l y s e n s e . n e t