



Bandweaver

Perimeter Intrusion Detection Systems 邊界入侵檢測系統



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Who Are We?

» Our vision is to be the first choice for integrated distributed fiber optic sensing solutions. Our systems are used to monitor, secure and keep personnel and critical assets safe.

- » Power
- » Fire
- » Security
- » Pipeline
- » Smart Monitoring

Bandweaver Key Facts

- » 成立年份：2002年
- » 安裝了 3,500 多個光纖感測系統
- » 安裝了超過 30,000 公里的光纖
- » 人數：>300
- » 主要技術
 - » Distributed Temperature Sensing, 分散式溫度檢測, DTS
 - » Distributed Acoustic Sensing, 分散式聲學檢測系統, DAS

Global Presence



Vertically Integrated Manufacturing

- » 10,000 m2 facility including Class 100 Clean room
- » High volume capacity
- » In-house development and manufacture of key components
 - » Control of Quality
 - » Guarantee of Supply
- » System Assembly



品質及可靠度

>95%

PROBABILITY OF
DETECTION

>100
KM

DETECTION
RANGE

>10
YEARS

MEAN TIME
BETWEEN FAILURE

- » 從產品設計到製造再到安裝和調試的整體成品質控制流程。
- » 基於電信產業的大批量化系統。
- » 廣泛的環境測試制度
 - » 內部設備和能力品保制度
 - » 第三方國際測試機構
 - » SIL 2 certified products (IEC 61508)

Distributed Acoustic Sensing

DAS 應用範圍

- » **周界入侵檢測系統 (PIDS)**
 - 牆壁、圍欄和掩埋檢測
- » **電力線監控 – 陸上和離岸**
 - 第三方干擾檢測，包括電纜和結構元件的盜竊檢測、防恐和破壞檢測
- » **管道檢測**
 - 第三方干擾檢測，包括pig球跟蹤、非法偷竊聽和周邊挖掘
- » **狀態監測**
 - 傳送帶、鐵路軌道、智慧城市和其他資產監控和預防性維護計劃

DAS概述

- » Coherent Rayleigh OTDR based technology (COTDR)
- » 遠距離監控 – 每個檢測單元長達 100+km – 可在現場部署多個單元以進行擴展檢測監控
- » 事件定位精度在 5 米以內
- » 智能分類 – 低干擾警報
- » 區域分割 Smart zone configuration
- » 可與第三方平臺整合，包括
 - » CCTV, VMS, PSIM, SMS, etc
 - » SCADA
 - » Building management systems
- » 滿足任何現場要求的產品系列
 - » Horizon – 管道、電力線、圍欄、牆壁和埋地檢測
 - » FenceSentry – 圍欄和壁掛式檢測



Perimeter Intrusion Detection Systems (PIDS)

- » Critical Site Perimeter Security
 - » Refineries and process plants
 - » Nuclear facilities
 - » Remote pump station
 - » Airports & Seaports
 - » Military sites
 - » Government buildings
 - » Utilities
 - » Telecoms
 - » Borders

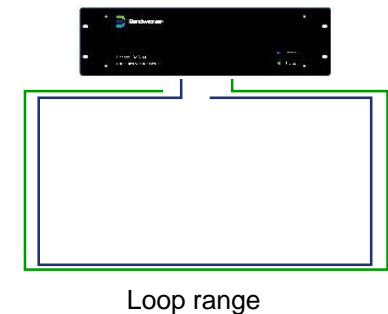
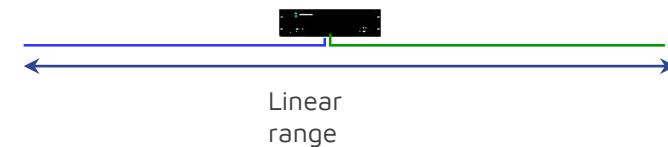
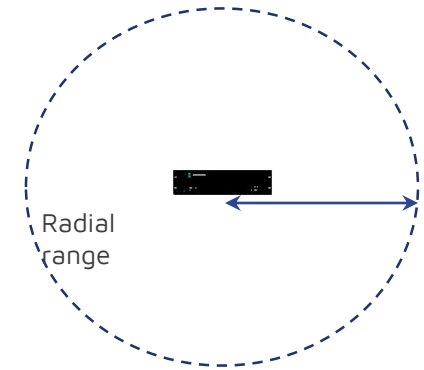


DAS Product range

Model name	Max Linear Range*	Radial/Channel Range*	Location Accuracy	No. of channels	Detection	Application
FenceSentry 5	10 km	5 km	1-5 meters	1 or 2	Fence or wall mounted	PIDS
Horizon 5	10 km	5 km	1-5 meters	1 or 2	Fence/Wall/Buried/Overhead/Asset	PIDS/Pipeline/Power/Condition Monitoring
Horizon 10	20 km	10 km	1-10 meters	1 or 2	Fence/Wall/Buried/Overhead/Asset	PIDS/Pipeline/Power/Condition Monitoring
Horizon 20	40 km	20 km	2-10 meters	1 or 2	Fence/Wall/Buried/Overhead/Asset	PIDS/Pipeline/Power/Condition Monitoring
Horizon 50	100 km	50 km	5-10 meters	1 or 2	Fence/Wall/Buried/Overhead/Asset	PIDS/Pipeline/Power/Condition Monitoring

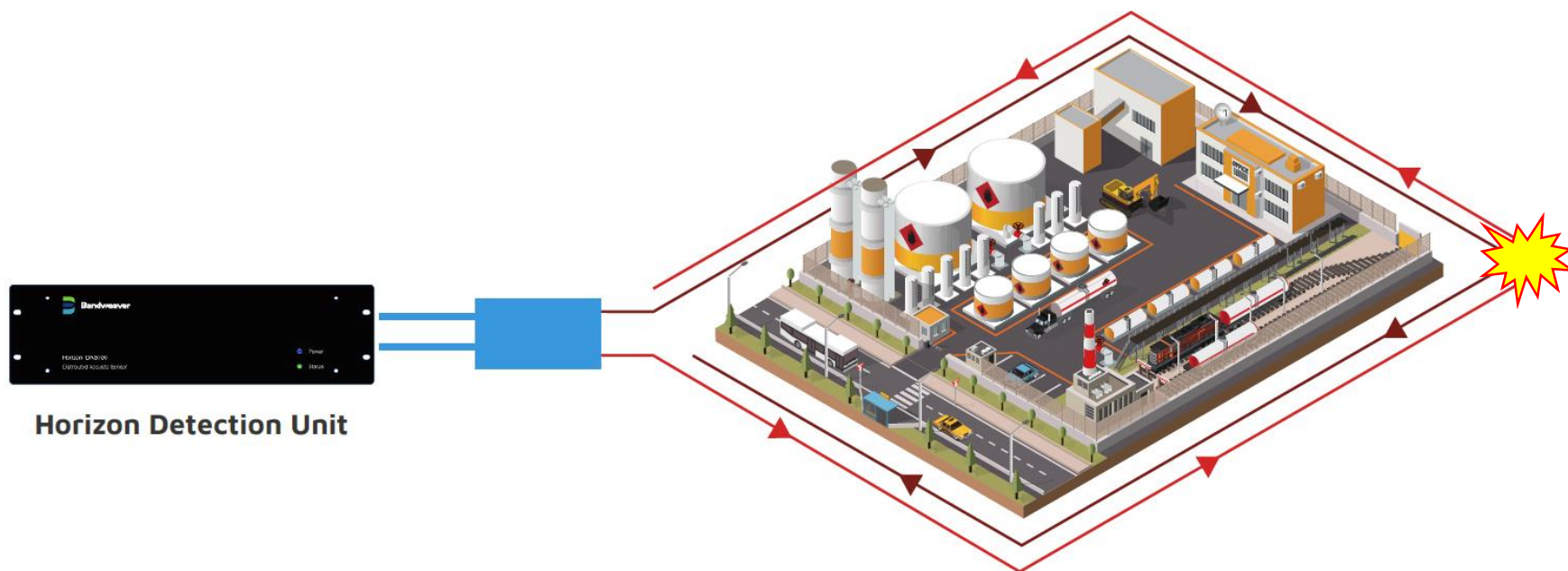
光纜佈放架構

- » 可以有多种方式佈放光纖來監控資產：
- » 徑向範圍是從檢測單元測量的最大徑向距離圍一圈
- » 直線式佈放是檢測單元配置中可以測量的最大直線距離
 - » 適用於雙通道系統和線性資產（管道、電力電纜、邊界等）
- » 環路方式是把當電纜末端返回到檢測單元
 - » 適用於光纜切割後備援的解決方案



使用雙通道系統的備援

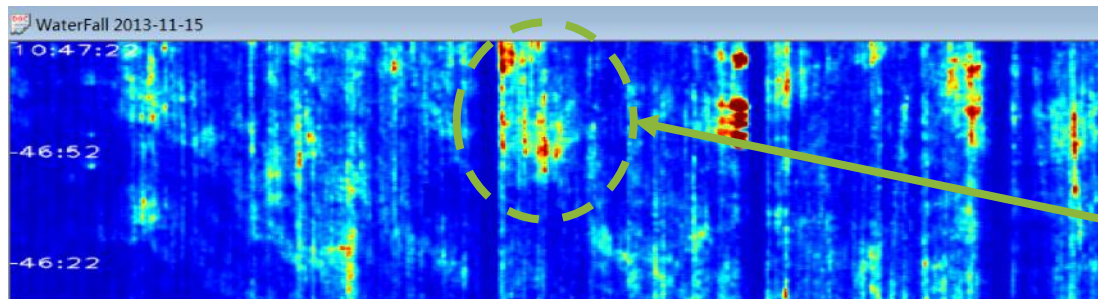
- » 韌性設計，可在光纜切斷或損壞時保持檢測能力。
- » 只需一條光纜，內有 2 個光纖芯和 2 個通道主機。



Advanced Environmental Algorithms

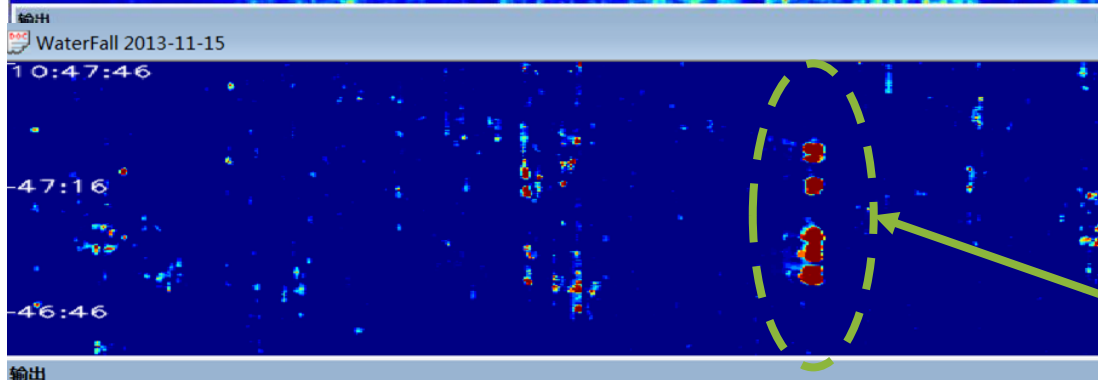
- » Pattern recognition algorithms differentiate between environmental and real intrusion events

Without environmental correction algorithm



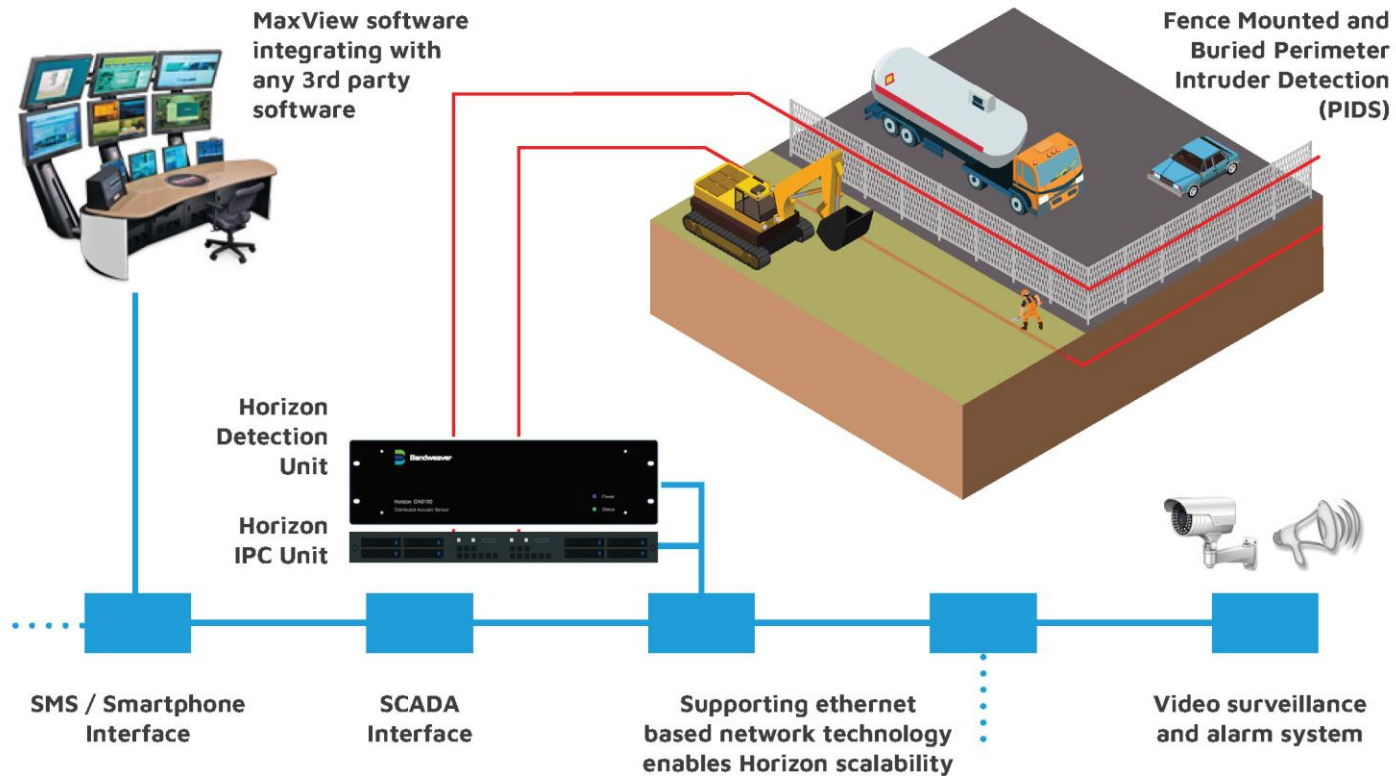
Vibrations caused by high winds

Using environmental correction algorithm



Real intrusion event

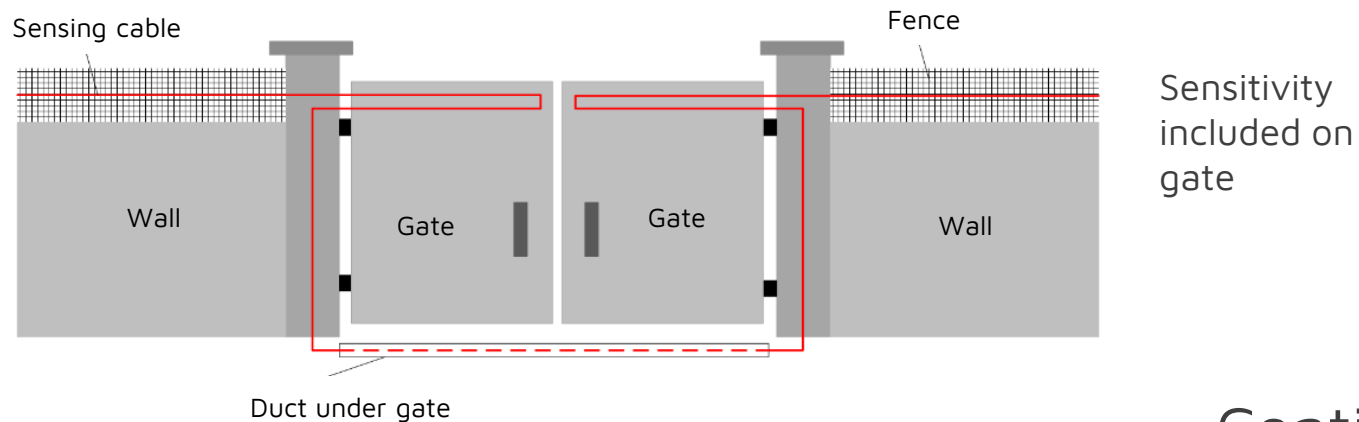
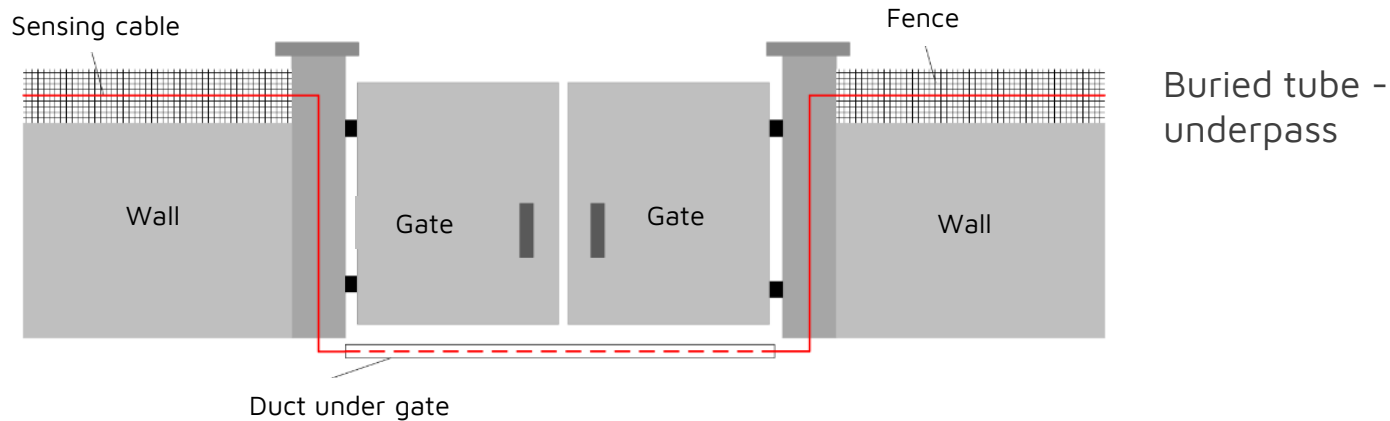
Example PIDS System Configuration



Fence or Wall Mounted System

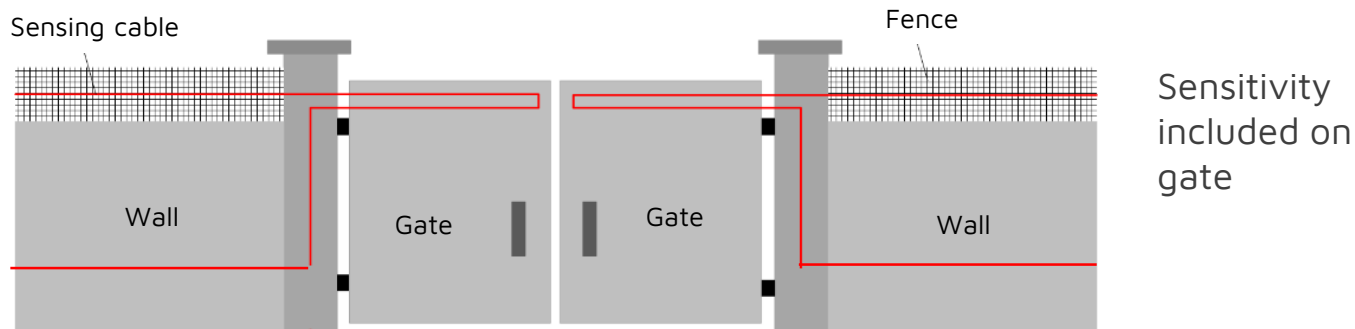
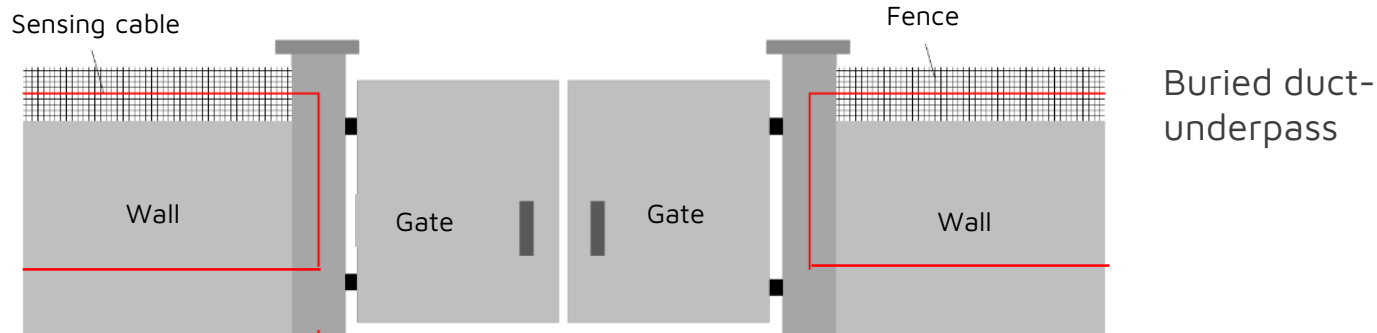


System implementation – Entrance and access gates



Continuous length –
run in duct under gate

System implementation – Entrance and access gates



Cable return loop along wall

Gate installation examples



Fiber loop on gate

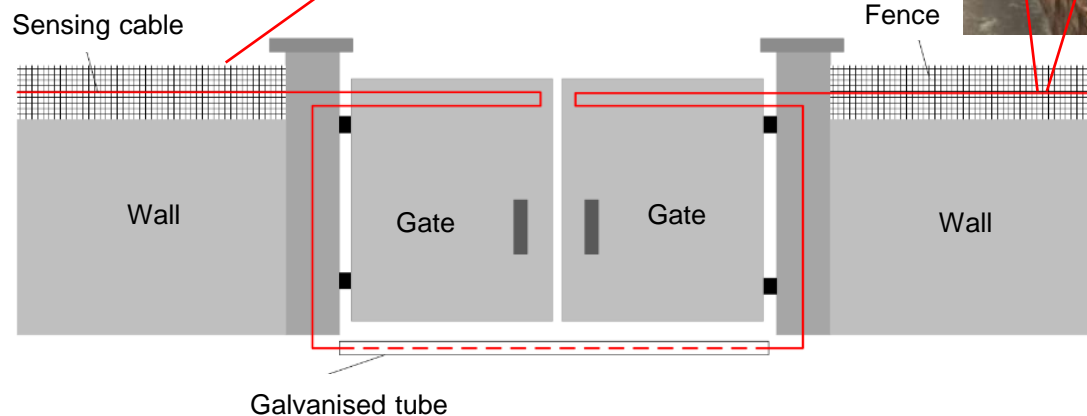


Fiber installed under gate

Fiber route under gate



PIDS Sensing cable installation examples

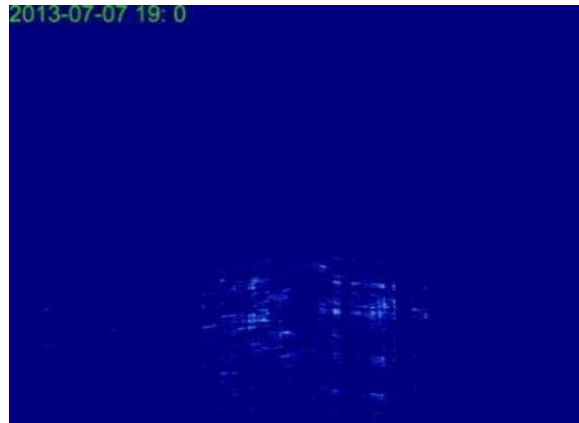


不受環境條件的影響

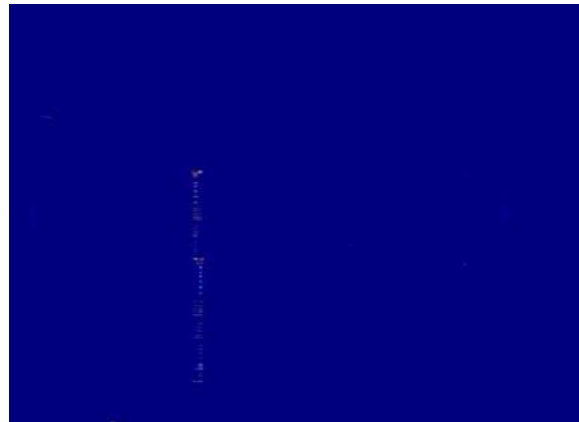
- » 移動識別：檢測單元應用智慧分類引擎，消除環境影響。
- » 廣泛的研發工作來開發演算法（目前在環境演算法的已有第24版）。
- » 聲譜分析以過濾掉環境條件引起的雜訊。



Immunity from environmental conditions



Spectral characteristics from wind



Spectral characteristics from real intrusion event

Pattern recognition algorithms differentiate between environmental and real intrusion events

Covert buried system



Horizon – Intrusion Detection

Event Type	Typical detection* (distance from cable in m)	Maximum** detection (distance from cable in m)
Personnel movement	5	10
Personnel digging	5	15
Mechanical digging	20	70
Vehicle detection	10	25

**Typical detection range is highly dependent on a number of factors including, cable construction, burial depth, soil type, fiber optic cable/splice quality... and so is only for guidance. Each section will need to be tuned accordingly.*

***The maximum distances are based on experiences on Bandweaver projects where events have been detected at these ranges. These distances cannot be guaranteed or expected but are possible in ideal conditions*

Buried detection Features and Benefits

- » Covert detection – ideal for sites that have little or no perimeter delineation
- » Unaffected by environmental conditions such as rain, fog, mist, high winds, etc
- » Can be fully integrated with pre-set CCTV camera positions for secondary visual confirmation of an intruder
- » No requirement for power or electrics in the field
- » Intrinsically safe solution with no risk of fire or explosion
- » Lifespan of fiber optic cable 25+ years – reduction of whole life costs
- » Fast installation utilising automatic ploughing machine
- » Minimal infrastructure requirements compared to alternate detection technologies



MaxView Software

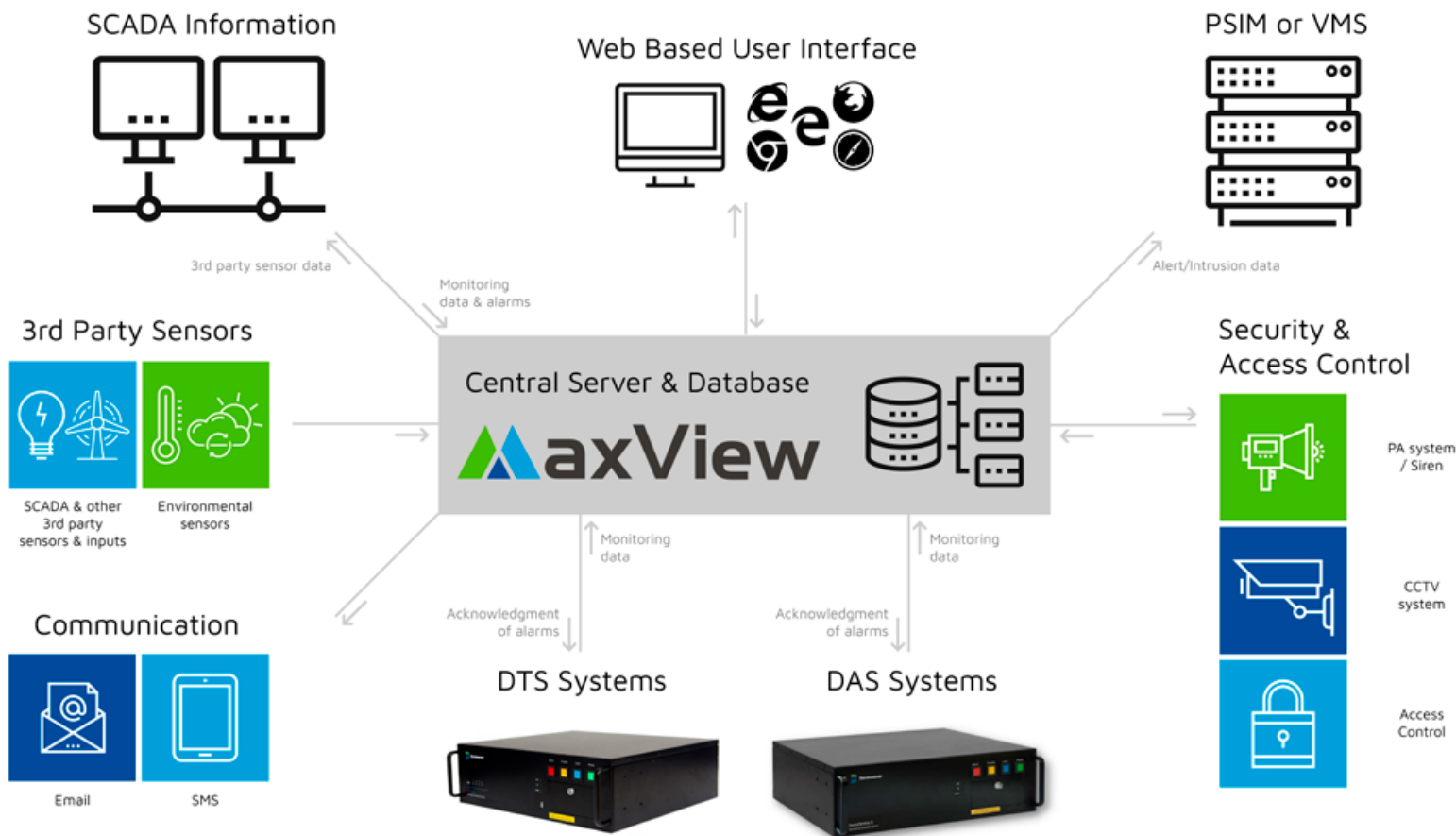
Integrated Monitoring Platform

Maxview

- » MaxView整合監控平臺提供了一個完全可客製的系統，它具有先進的視覺化和分析功能。
- » MaxView是一種通用型的解決方案，已廣泛應用於電力公司、結構健康、製程、煉油和管道監控等行業。
- » MaxView可以連結到第三方平臺介面，包括SCADA，DCS，CCTV，PSIM，VMS等..。



MaxView interconnections

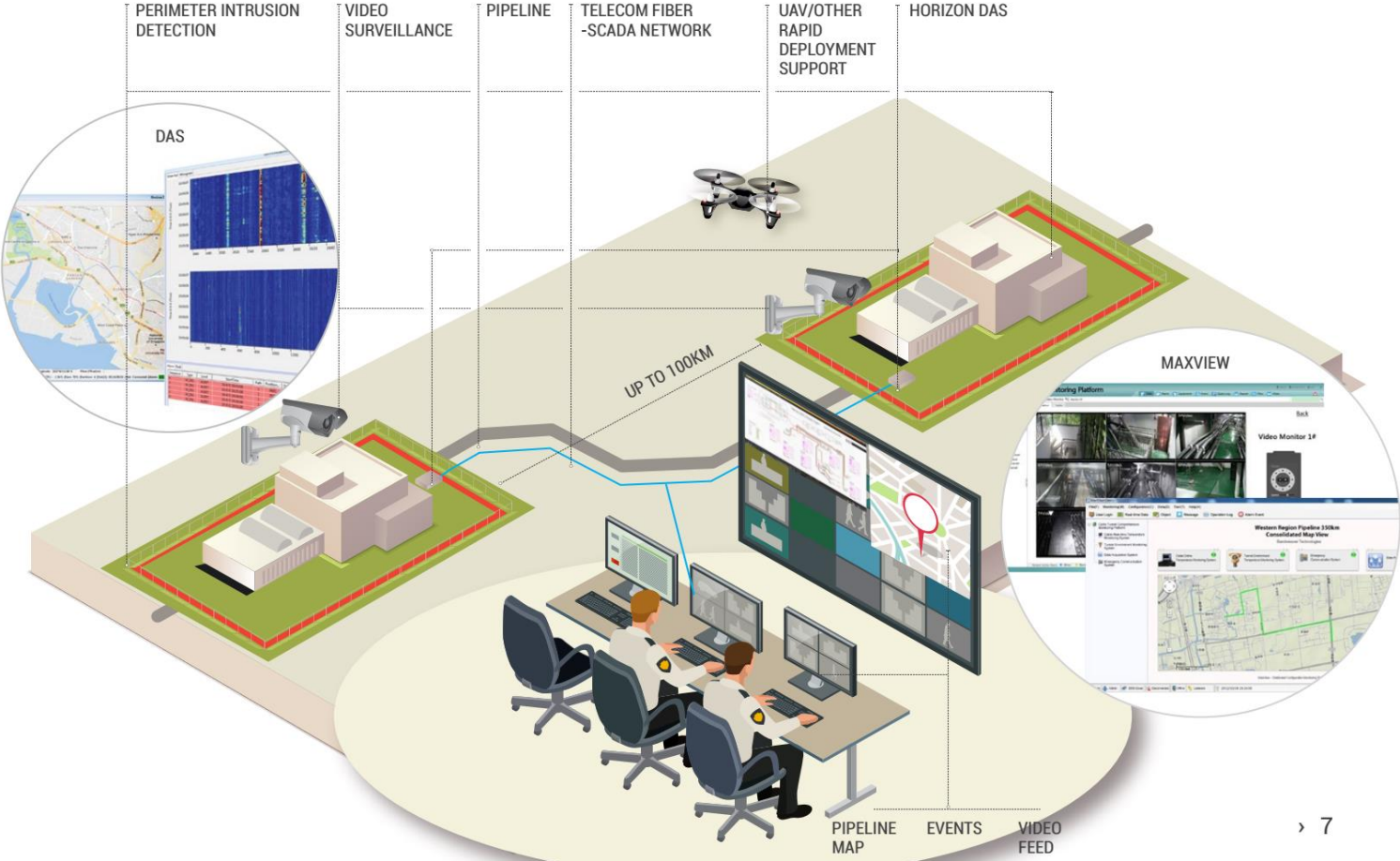


Maxview – Security

- » 通過MaxView軟體平臺，操作員可以快速收到有關潛在周界入侵的警報，並實時跟蹤任何入侵者的進度。
- » MaxView在動態地圖上顯示準確的即時位置資訊，以及警音和視覺警報。
- » 攝影頭也可以直接整合到MaxView中，提供周界入侵的輔助視覺指示，使操作員更加自信。
- » MaxView能夠無縫整合到第三方軟體，包括PSIM，VMS，SMS等，在您的集中式安全監控軟體中起著關鍵作用。



System Integration across multiple sites



Screenshot of Map

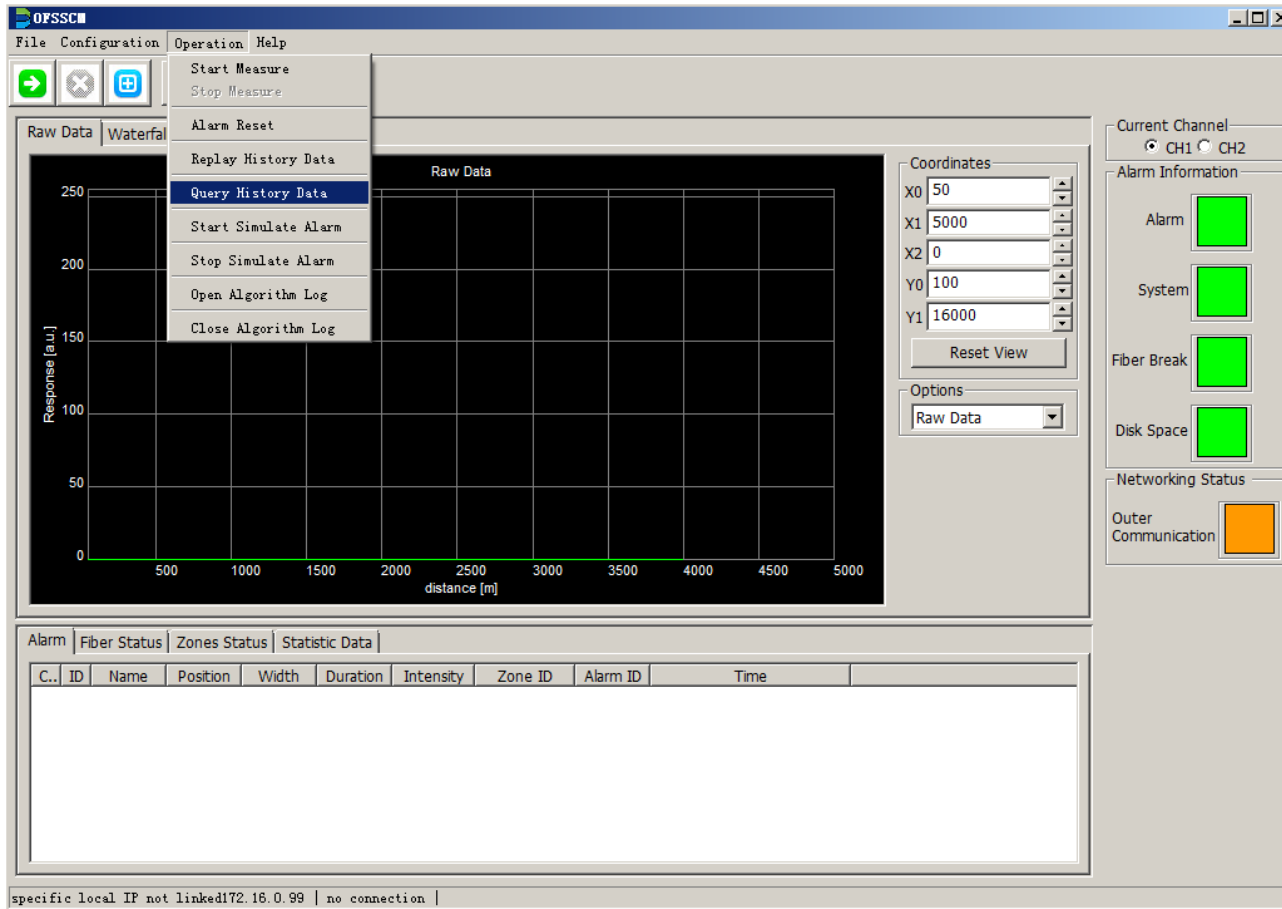


Bandweaver FIDS Monitoring Platform with video feeds from HikVision example

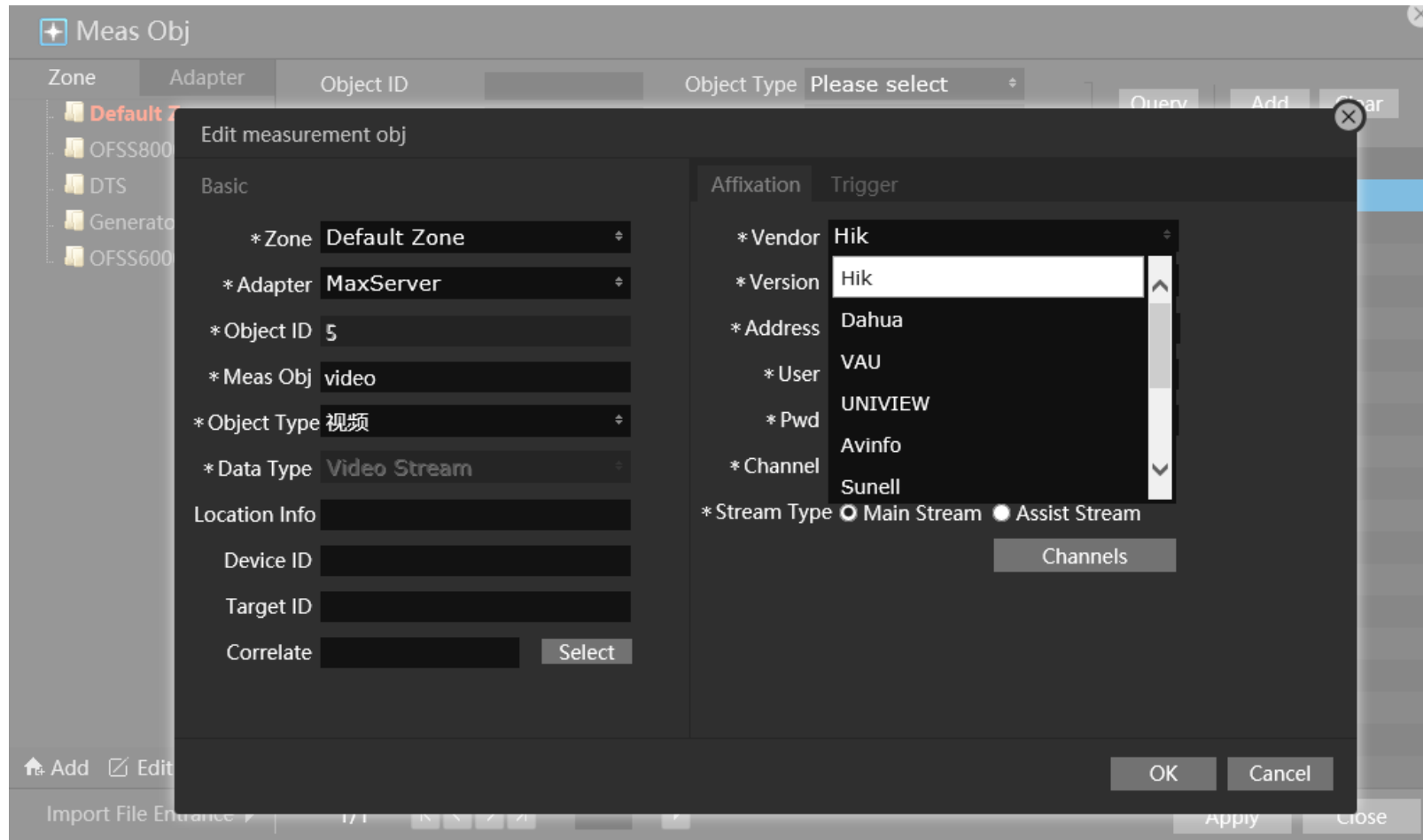
Newest Active Alarm											
Zone	Team	Alarm Obj	Severity	Alarm Type	Alarm Time	End Time	Description	Merge Co...	Clear	Confirm	Locate
OFSS6000		CH1-zone1	Critical	断纤告警	2018-11-20 13:34:27		7 fiber break	0	Clear	Confirm	Locate >
OFSS6000		CH1-zone1	Critical	断纤告警	2018-11-20 13:33:07	2018-11-20 13:40:01	7 fiber break	0	Clear	Confirm	Locate >
OFSS6000		CH1-zone1	Critical	断纤告警	2018-11-20 13:30:57	2018-11-20 13:38:34	10 fiber break	0	Clear	Confirm	Locate >

*English/Chinese options available

System Display



NVR Selection as a standard option



*English/Chinese options available

System on historical alarms

The screenshot displays the OFSSC software interface. A 'Query History Data' dialog box is open, allowing users to search for historical alarms. The dialog box contains the following elements:

- Query Conditions:** Zone ID (text input), Start Time (2018/11/19), End Time (2018/11/19), Query button, and Export Query Result button (highlighted with a red underline).
- Query Alarm:** Query Operation on Zones
- Table Headers:** C.., Zone..., Alarm ID, Time, Name, Position, Width, Duration, Intensity, Alarmed, ID

The background interface shows a 'Raw Data' plot with 'Response [a.u.]' on the y-axis (0 to 250) and 'Raw Data' on the x-axis. The right sidebar contains status indicators for 'Alarm', 'System', 'Fiber Break', 'Disk Space', and 'Networking Status'.

specific local IP not linked | 172.16.0.99 | no connection |

References

China Mobile Datacenter



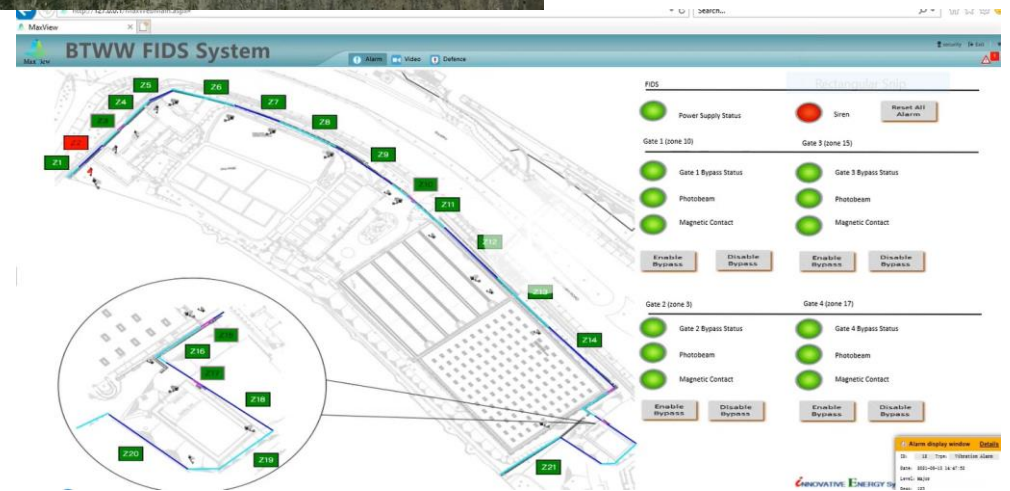
References

JIDP



References

BTWW-Ongoing



Conclusion – Why Bandweaver?

- » Largest Distributed sensing manufacturer in world
 - » Economies of scale = most competitive pricing
- » Vertically integrated supply chain
 - » High volumes (>10 million units per year) = highly repeatable, reliable processes
 - » High level of control over quality
 - » Responsive development = leading technology
- » Specialised to industrial sensing applications
 - » Designed specifically for customer needs
 - » Extensive experience (>2000 systems)



Established International Customers and Partners

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Thank you