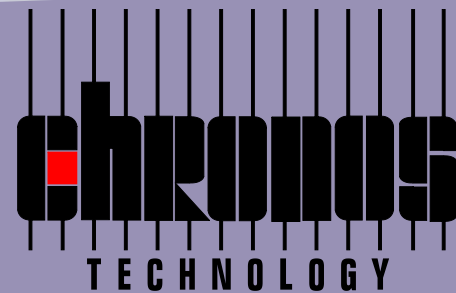


GNSS Vulnerability Detection & Mitigation



Chronos Technology Ltd

sales@chronos.co.uk

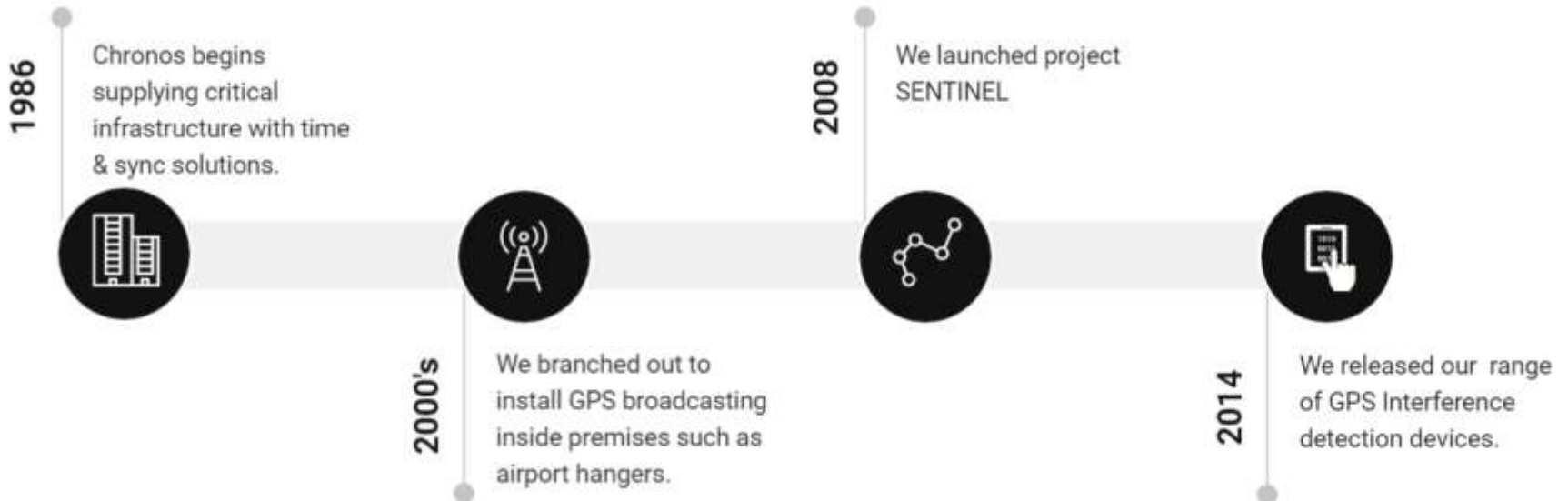
+44 1594 862 200

©2020 Chronos Technology: COMPANY PROPRIETARY

Agenda

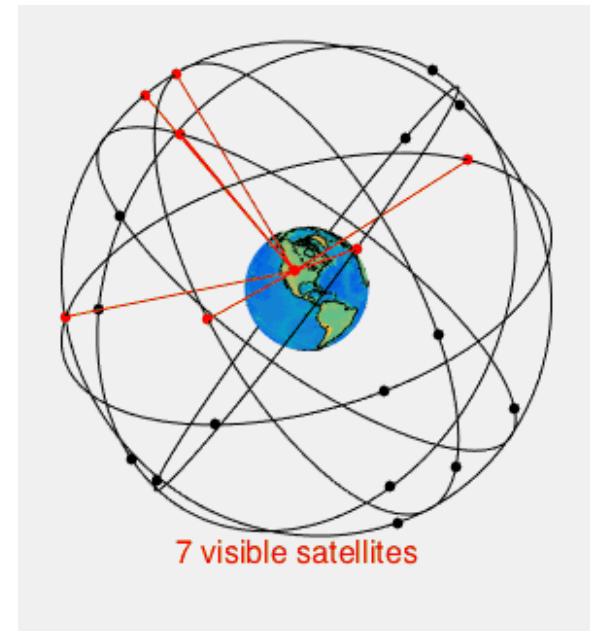
- Overview of Chronos Technology
- Overview of GPS
- Jammers
- Chronos' Portfolio

How did we get here?



What is GPS?

- 33 satellites
- 12,500 miles away
- L1 - Civilian = (1575.42MHz)
- L2 - Military (1227.60 MHz)
- L5 - Proposed safety-of-life signal (1176.45 MHz)



- GPS is just one of many Global Navigation Satellite Systems (GNSS) available, including Galileo (Europe), GLONASS (Russia) and BeiDou (China)

Who is vulnerable to GPS Disruption?

- Navigation
- Telecommunications
- Bank trading
- Power grids
- Emergency services & Armed forces

GPS is especially vulnerable to interference

Common Jamming devices

Small

Easy to plug into a vehicle, cheap and common



Handheld

Covers multiple frequencies, can often jam mobile signal and trackers



High Power

Jams GPS, trackers, WiFi, Bluetooth, car keys, Police comms, phone signal, etc.



Who uses Jammers?

Vehicle Theft

Criminals knock out vehicle
and asset tracking

International warfare tactics

Russia are suspected of using
GPS Jamming and spoofing to
interfere with navigation

Hiding from a tag

GPS Leg tag offenders can
block the signal



Plant Theft

Machines worth upwards of
£100,000 are stolen
frequently

Organised crime gangs

To hide their movements,
gangs will jam their
surroundings

Skiping off for lunch

Hiding from fleet telematics,
while causing issues to
infrastructure

New 12V 2W Vehicle Car GPS Signal Interference Shield Tracking Interceptor

Condition: **New**

Quantity:

1

0 available
[32 sold](#)

£4.99



Collect **5** Nectar points
[Redeem your points](#) | [Conditions](#)

Postage: **Free** Economy Delivery | [See details](#)

Item location: HAYES, United Kingdom

Posts to: Worldwide [See exclusions](#)

Mouse over image to zoom



Have one to sell? [Sell it yourself](#)



A12 30W Super High Power GPS WiFi Lojack 3G 4G 5.8G Jammer

This is a super high power 12 band multifunction jammer. 30W high power, interference distance up to 75 meters. The interference distance can be adjusted as needed. The jamming performance is very stable.

\$658.58 ~~\$1176.03~~

44% OFF

CTL3510 GPS Jamming Detector



Chronos' handheld detection device

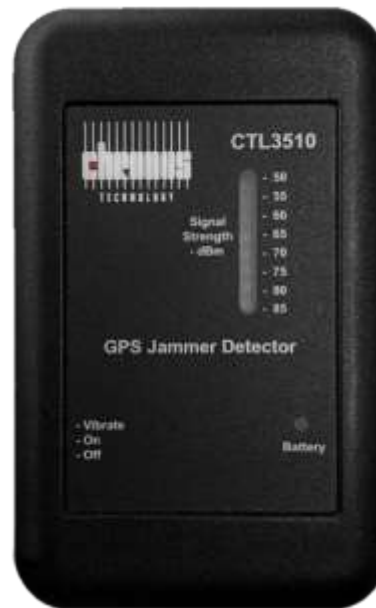
POCKET SIZE

Small enough to be equipped on your person or mounted in a vehicle.



VIBRATION ALERT & LOGGING

Internal vibration and covert mode, with a logging feature.



VISUAL INDICATION

Colour-based LEDs show the growing severity of interference.



EXTENDED BATTERY LIFE

8 hour standby battery life, or keep on while charging.



CTL3520 GPS Jamming Detector and Locator

Chronos' handheld detection and location device

ERGONOMIC HANDLES

Easy to hold for directional finding abilities.



DIRECTION INDICATION

Direction bar displays the direction of the source of interference.



ADJUSTABLE ATTENUATION

Change the sensitivity of the device to locate the source in close proximity.

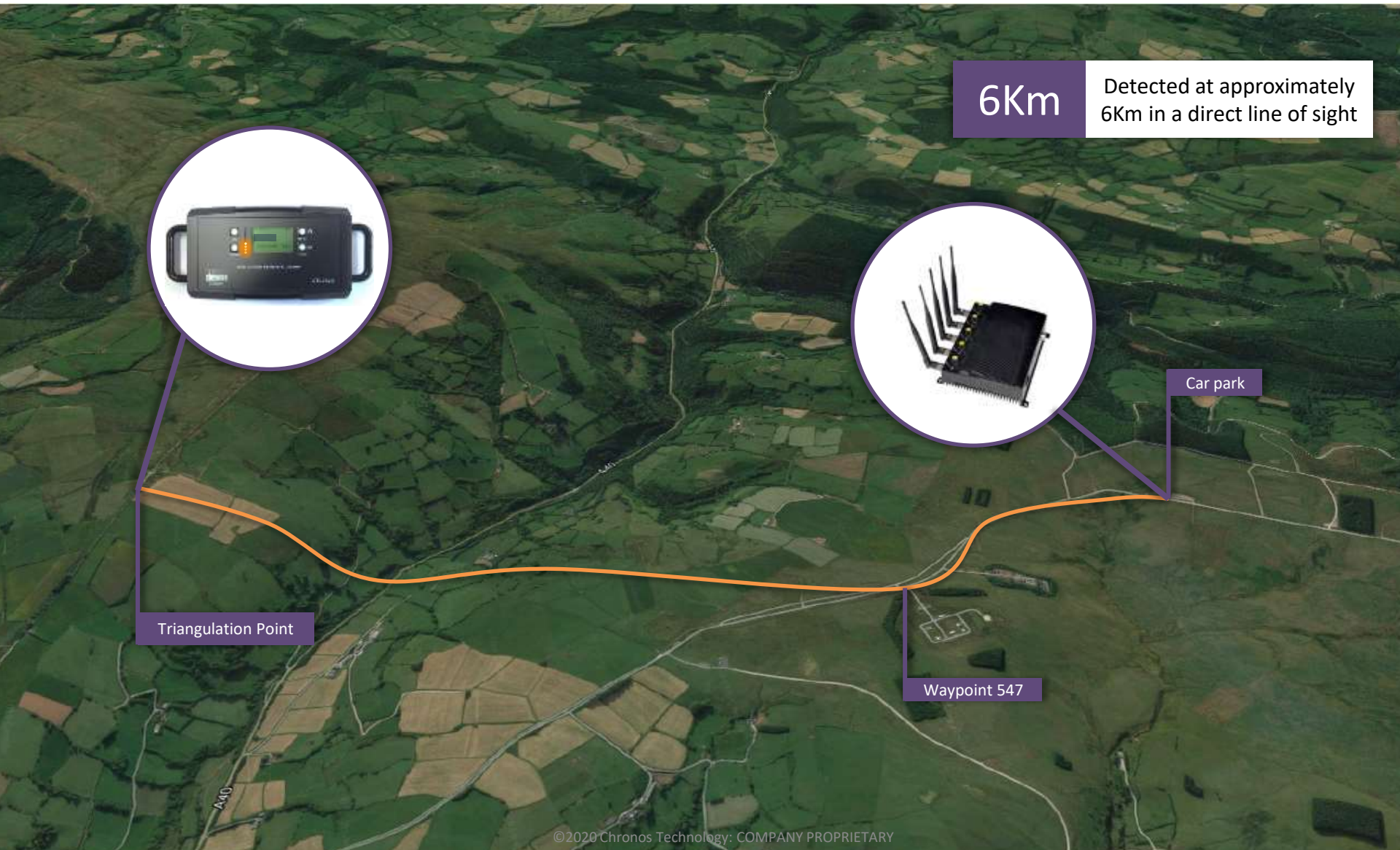


LCD DISPLAY SCREEN

Visual display of data including battery life and attenuation.



Detection of 3W GPS Jamming



Who uses Jamming Detectors

- Military
- Law Enforcement
 - Highway departments / patrols
 - Car Theft Units
 - Organised Crime departments
- Central Government Agencies
 - Border agencies
- Homeland Security
- Infrastructure
 - Power
 - Telecommunications
 - Survey

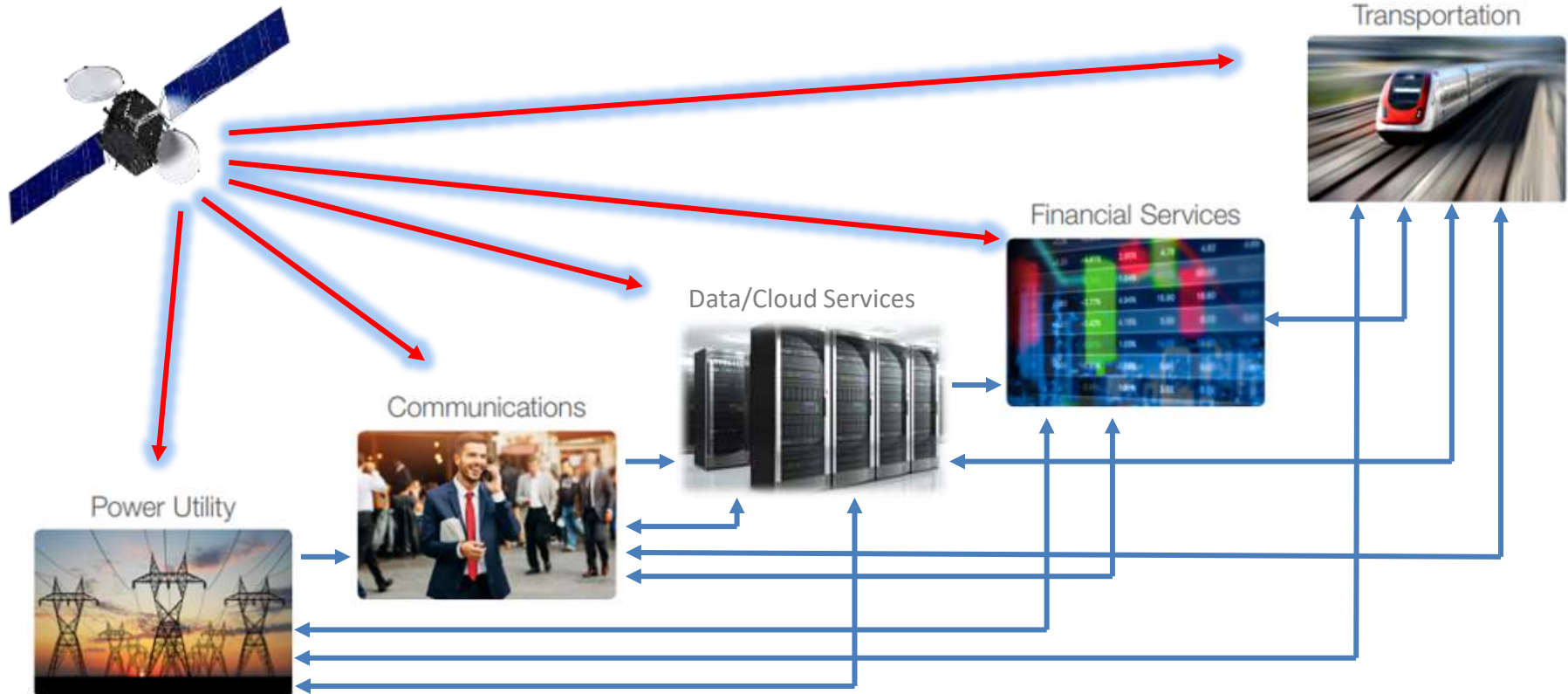




Mitigation Infrastructure Microchip BlueSky Firewall



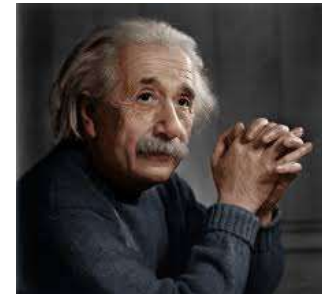
GNSS is a single point of failure for Critical Infrastructure



Signal-in-Space Vulnerabilities

- **Signal in space vulnerabilities are generally categorized based on the failure mode they induce in a GNSS receiver**

- **Jamming:** Partial or complete loss of ability to receive GNSS signals
- **Spoofing:** Tricking a GNSS receiver into receiving illegitimate signals



We cannot solve our problems with the same thinking that we used when we created them.

- Albert Einstein

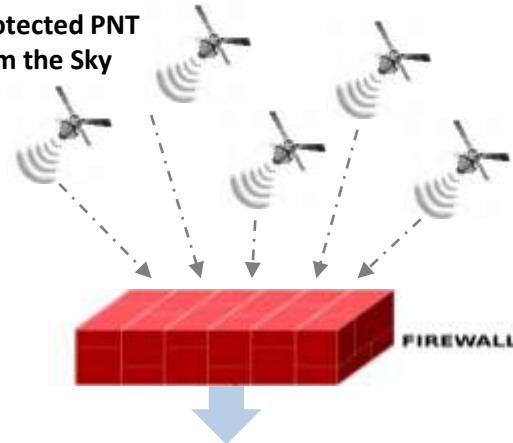
System	GPS	GLONASS	BeiDou	Galileo	IRNSS
Owner	United States	Russian Federation	China	European Union	India
Coding	CDMA	FDMA	CDMA	CDMA	CDMA
Frequency	1.57542 GHz (L1 signal) 1.2276 GHz (L2 signal)	Around 1.602 GHz (SP) Around 1.246 GHz (SP)	1.561098 GHz (B1) 1.589742 GHz (B1-2) 1.20714 GHz (B2) 1.26852 GHz (B3)	1.164–1.215 GHz (E5a and E5b) 1.260–1.300 GHz (E6) 1.559–1.592 GHz (E2-L1-E11)	1.17645 GHz (L5) 2.492028 GHz (S1)

Firewall Concept

Physical Firewall at Electrical Substation



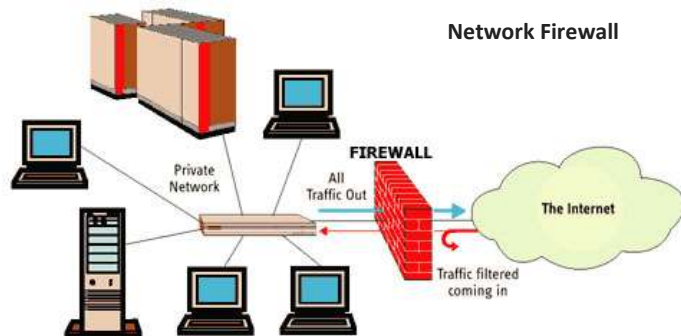
Unprotected PNT
from the Sky



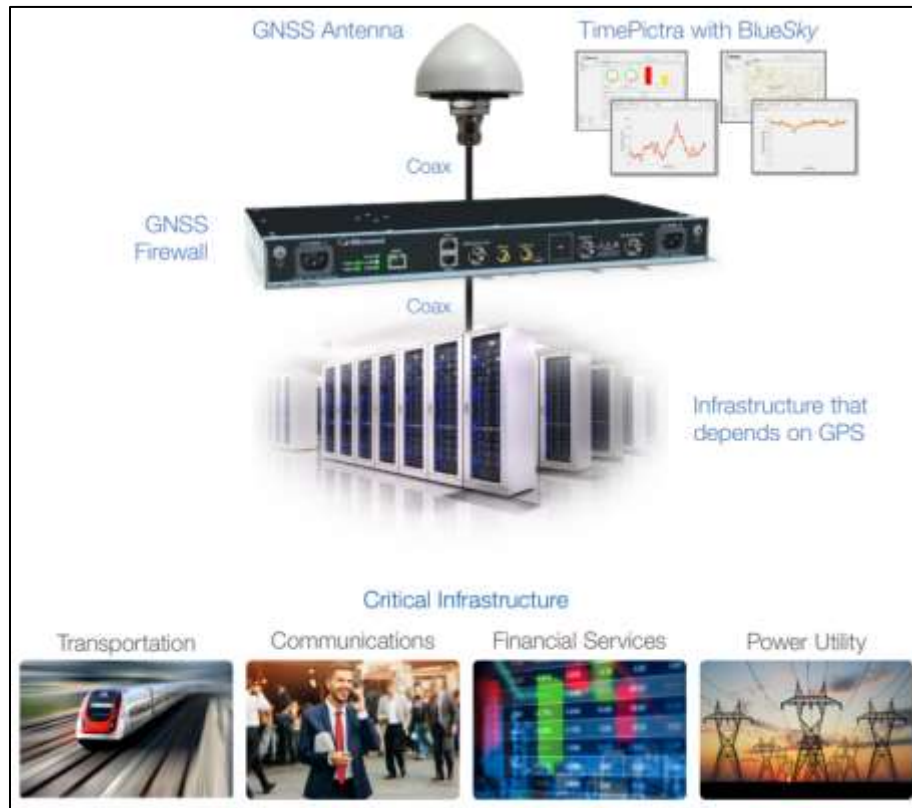
Secure PNT for Critical Infrastructure



Network Firewall



Secure Firewall Overlay



- Protects GPS systems from spoofing and jamming
- Simple connection between GNSS antenna and GPS system
- Optional internal MAC for holdover
- 1PPS and 10 MHz timing reference inputs for extended holdover (connection to external cesium reference)
- Redundant AC or DC power options
- Command Line Interface (CLI) in addition to secure and easy-to-use web interface
- “BlueSky Performance Monitoring” integrated within TimePictra (included as part of BlueSky Subscription)
- New steel chassis with CE compliance

A close-up, monochromatic photograph of mechanical gears and a central shaft, rendered in shades of blue and grey. The focus is sharp on the central shaft and the gear teeth immediately surrounding it, with a blurred background of other gears.

Thank You

Chronos Technology Ltd
sales@chronos.co.uk
+44 1594 862 200

