



INTRODUCTION TO HANOVER DISPLAYS

AT THE HEART OF GLOBAL TRANSPORTATION

HANOVER AT A GLANCE

Hanover designs and manufactures passenger information systems for the public transport industry, with satisfied customers in over 75 countries worldwide.

1985

Established
1985
in Lewes, UK



Family
owned and
managed



Financially
independent



Full in-house
manufacturing
facilities in UK
& USA



50 million euro
annual turnover,
with over 80%
export sales



From left to right: Gavin Williams and his twin sons, Andy and Dave Williams

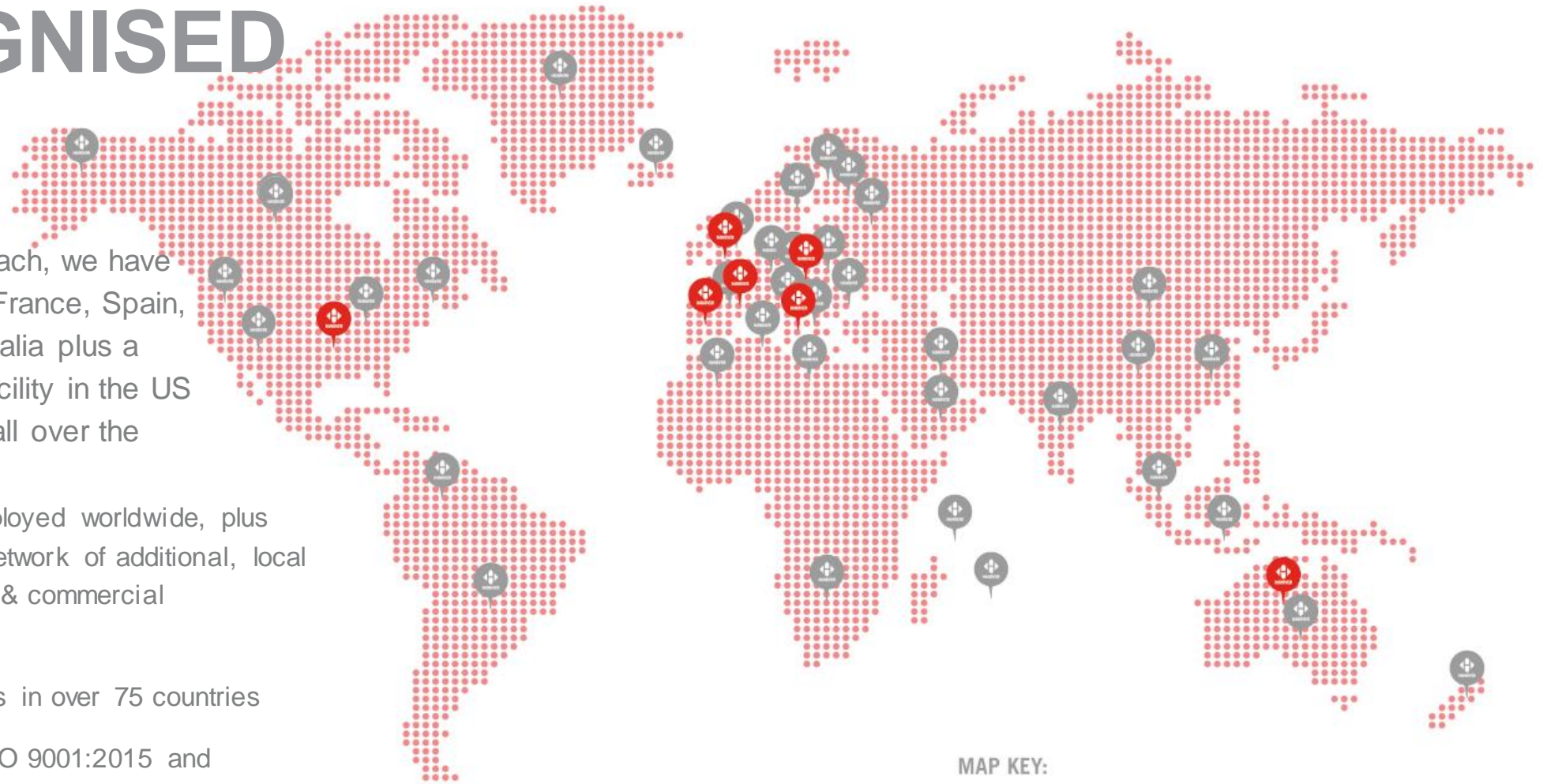




GLOBALLY RECOGNISED

With a truly global reach, we have subsidiary offices in France, Spain, Germany, Italy, Australia plus a second production facility in the US and representatives all over the world.

- ❖ Over 300 staff employed worldwide, plus extensive global network of additional, local support personnel & commercial representatives
- ❖ Satisfied customers in over 75 countries
- ❖ ISO Accredited: ISO 9001:2015 and 14001:2015
- ❖ ITxPT Strategic Member



MAP KEY:

-  SUBSIDIARY OFFICES
-  REGIONAL SUPPORT



PRODUCTION FACILITIES

Hanover is the worlds' leading independent supplier of passenger information systems for the public transport industry. We achieve this through innovation, product reliability and outstanding customer service.

- ❖ PCB Production
- ❖ Sign Assembly
- ❖ Test, Quality and Control
- ❖ Dispatch
- ❖ Technical Support Team
- ❖ Engineering
- ❖ Research & Development
- ❖ Repairs & Warranty Support

UK PRODUCTION FACILITIES

Hanover also have production facilities in the US.



PRODUCTION EQUIPMENT

We are committed to delivering the highest quality products and services that meet or exceed the needs and expectations of our customers and to managing the impact our activities have on the environment.

- ❖ Fully equipped production lines incorporating latest automated machinery
- ❖ Conventional placement (thru-hole LED)
- ❖ Pick and place SMD lines
- ❖ COBOT machines for PCB testing
- ❖ Flow and selective soldering machines
- ❖ Automatic test equipment
- ❖ Optical inspection machines for PCB
- ❖ Climate controlled component storage





GLOBAL PRODUCTION CAPABILITIES

PRODUCTION

- ❖ Consume over 2.5M through-hole LEDs per month
- ❖ Consume over 4M SMD LEDs per month
- ❖ Production capacity of >85,000 units per year
- ❖ Bespoke design / customer solutions
- ❖ Production floor space approx. 100k sq ft (UK), 35k sq ft (US)

SHIPPING

- ❖ Build and ship 3,500 LED signs per month consisting of 85,000 individual PCBs per month
- ❖ >9,000 shipments per year to global customer base
- ❖ Equipping approx. 22,000 buses per year (predominantly new build – some retrofit)

TECHNICAL SUPPORT

When you purchase a Hanover product you can be assured of the highest levels of customer support and service.

TECHNICAL SUPPORT

- ❖ Rapid response
- ❖ Reliable expert advice
- ❖ Effective solutions

REPAIR SERVICES

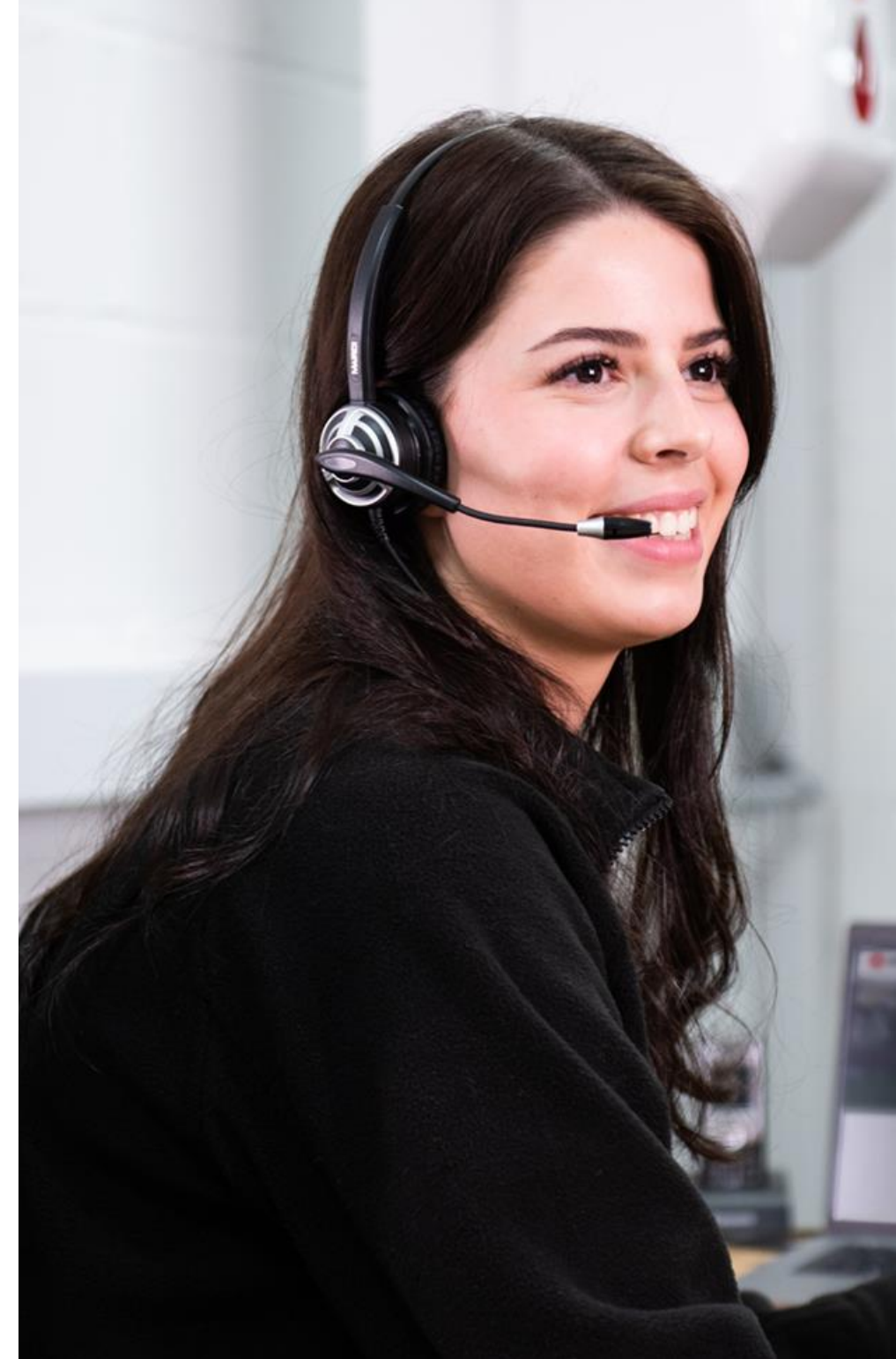
- ❖ Rapid turnaround
- ❖ Repairs in UK or on-site
- ❖ Highly skilled technicians

INSTALLATION SERVICES

- ❖ Available globally
- ❖ Proven skills
- ❖ Expert, dependable installation

TRAINING PROGRAMMES

- ❖ Software programming
- ❖ Basic trouble shooting
- ❖ System commissioning





LED DESTINATION DISPLAYS

- ❖ Ambient light sensor for automatic brightness adjustment
- ❖ Patented LORA software to reduce energy consumption
- ❖ Bin-graded LEDs for consistent and uniform colour
- ❖ Slim, lightweight case design
- ❖ Multi-colour (RGB), curved and 12V variants available
- ❖ Integrated controllers
- ❖ Multi-lingual display programming with wireless downloading options
- ❖ High reliability and extended 10-year warranty as standard
- ❖ R10, R118 and ITxPT certified
- ❖ Full UK manufacture, quick delivery and security of supply

POWER SUPPLY

Hanover G4 LED displays use our most efficient and lowest profile power supplies to date.

SURFACE MOUNT LEDs

G4 displays use the very latest generation of Surface Mount LEDs, providing the best efficiency available and allowing for a slimmer case design.

PROCESSOR

Our G4 display processor supports all previous generation display features and now includes IP connectivity as an option.

ULTRA THIN DESIGN

Our new ultra thin, lightweight design enables easier installation and supports savings on fuel consumption.





HIGH RESOLUTION DISPLAYS

- ❖ Our High Resolution Displays incorporate at least 15x more LEDs than standard displays, providing much improved character definition and graphical capabilities
- ❖ LED pitch reduced down to 2mm and fully compliant with TfL specification
- ❖ Greyscaling further enhances the quality of text and images displayed
- ❖ The new technology provides “screen print” clarity without the pixelated appearance of standard displays.
- ❖ Perfect rendition of specific font styles, (New Johnston font for TfL)
- ❖ Same cabling and connectors as standard displays
- ❖ Same reliability and extended warranty as standard LED displays





CONTROLLERS

Our range of system controllers can act either as a primary driver interface in stand-alone applications or can be interfaced to other 3rd party equipment in integrated systems, enabling automatic updates of the destination displays.

- ❖ Seamless integration with 3rd party equipment
- ❖ Standard communication: RS485, Ethernet
- ❖ Additional options: RS232, RS422, IBIS & J1708
- ❖ Plug-in interfaces (e.g. ticket machines and on-board computers)
- ❖ Wi-Fi update option (including PC management software)
- ❖ Provides reliable back-up solution if 3rd party OBC fails / loses GPS



DG3 CONTROLLER

- ❖ Simple 4-button keypad
- ❖ High resolution, full graphical OLED display
- ❖ 8Mb memory and easy USB loading



EG3 CONTROLLER

- ❖ As DG3 including full alphanumeric keypad
- ❖ Illuminated buttons for selection options
- ❖ Standard DIN radio mount installation

NEW EG4 CONTROLLER



Our latest EG4 controller has the following key features:

- ❖ Full-colour 5" touch screen display with automatic brightness control
- ❖ Fully backward-compatible with existing models
- ❖ Ethernet connectivity; CAN interface
- ❖ Wireless downloads



NEW TFTs

Clear passenger information is essential to ensure the smooth running of transport networks, for both the customers and the bus operator. Our new range of TFT displays provide crystal clear information to the travelling passengers. The displays are automatically updated through a number of different inputs, e.g. GPS, door switch and odometer.

SMART

- ❖ Ethernet-connected and suitable for any IP networked vehicle.
- ❖ Multiple screens / mixed display sizes, resolutions and formats in one system.
- ❖ More flexibility in terms of display content with different channels being broadcast simultaneously.
- ❖ Suitable for split-screen content.
- ❖ Best quality image/video resolution.

STANDARD

- ❖ Compatible with existing HTC systems and 3rd party OBCs with VGA (or DVI) output.
- ❖ Good solution for single (or double) unit / single channel (i.e. passenger info only) per vehicle.
- ❖ Can be used with videos where synchronised audio is required (audio output from HTC).





TFT DESIGN / CONTENT EXAMPLES

DESTINATION/ ADVERTISING / TWITTER / CLOCK

Next stop:
SHOPPING CENTRAL (5 Minutes)

TOWN CENTRE
SHOPPING CENTRAL
THE QUAY
THE GREEN

£5 Pizzas
Delivery and Collection

Joe Johnson
Apologies Route 12 service is currently unavailable until 6am tomorrow

Sarah Samson
You'll need to wear a face covering when traveling with us. They need to be worn at all times...

12:53 pm

ADVERTISING

Gournay Garden Centre

2 minutes from the next stop
Friston Pond, Friston

DESTINATION/ HEALTH & SAFETY ALERTS

NEXT STOP
Bristol Bus Station

12:53 pm

A HEALTH AND SAFETY MESSAGE

You must wear a face covering when travelling on our buses unless you meet the exemption criteria set by the government.

DESTINATION/ TWITTER SCREEN

7 Cardiff

HANOVER

University Park Place Maindy Road Minster Street Landmark Street Britton Street

Next Stop: Park Place

Connections: 9 11

Joe Johnson
Apologies Route 12 service is currently unavailable until 6am tomorrow #hashtag

Sarah Samson
You'll need to wear a face covering when travelling with us. They need to be worn at all times and cover both your mouth and nose

Laura Stanton
Remember Peter's Road, Lewes stop is suspended both today and tomorrow due to roadworks #hashtag

NEXT STOP

Next stop:
TOWN CENTRE (5 Minutes)

TOWN CENTRE
5 MINUTES

THE QUAY
11 MINUTES

THE GREEN
23 MINUTES

01/02/2020 09:08pm

DEPARTURES BOARDS AND SERVICE UPDATES

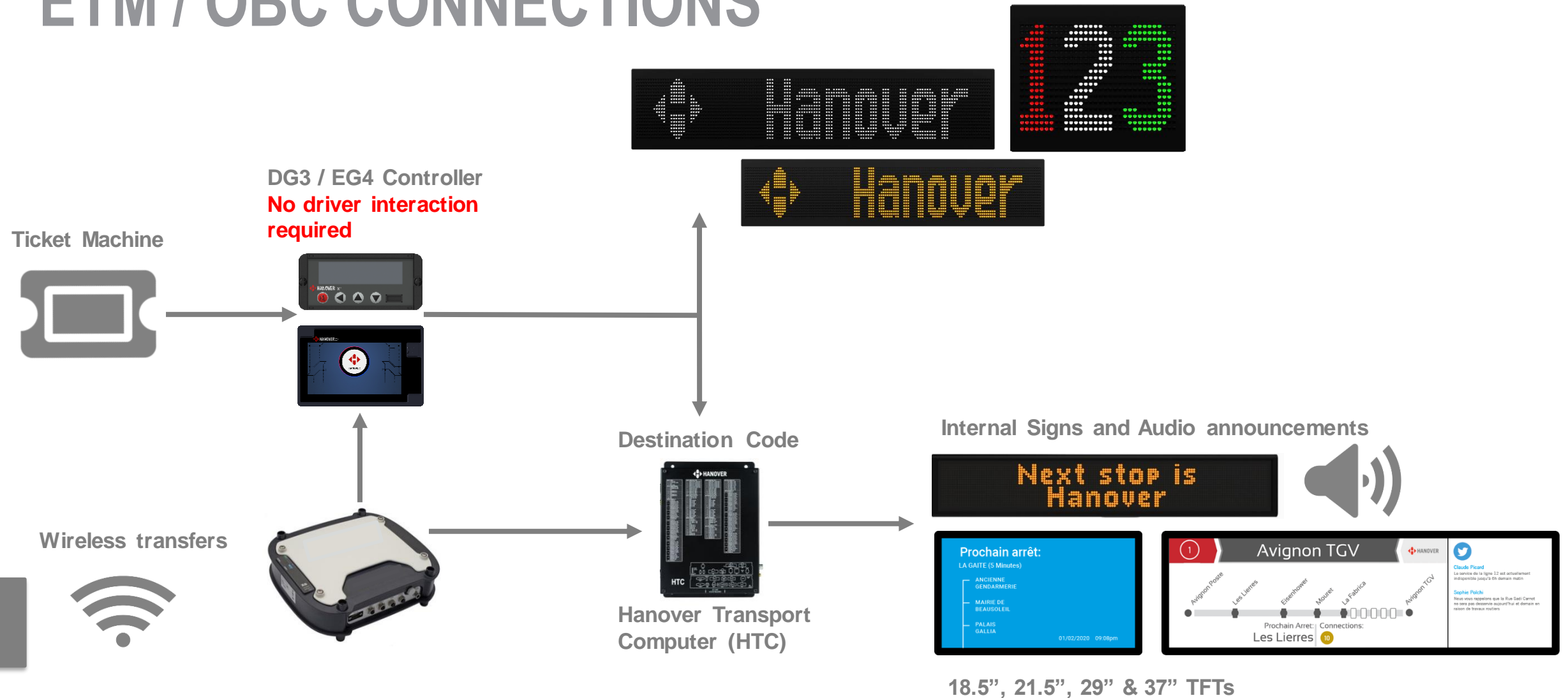
RAIL DEPARTURES

TIME	DESTINATION	PLATFORM	DUE
00:10	MANCHESTER	6	ON TIME
00:48	LIVERPOOL	2	EXP 00:52
01:25	MANCHESTER	6	ON TIME

Service Update

ROUTE 12 - 9000	ROUTE 2 - 9000
ROUTE 28 - 9000	ROUTE 19 - 9000
ROUTE 46 - 9000	ROUTE 23 - BUS REPLACEMENT
ROUTE 25 - DELAYED	ROUTE 5 - 9000

SYSTEM OVERVIEW WITH ETM / OBC CONNECTIONS



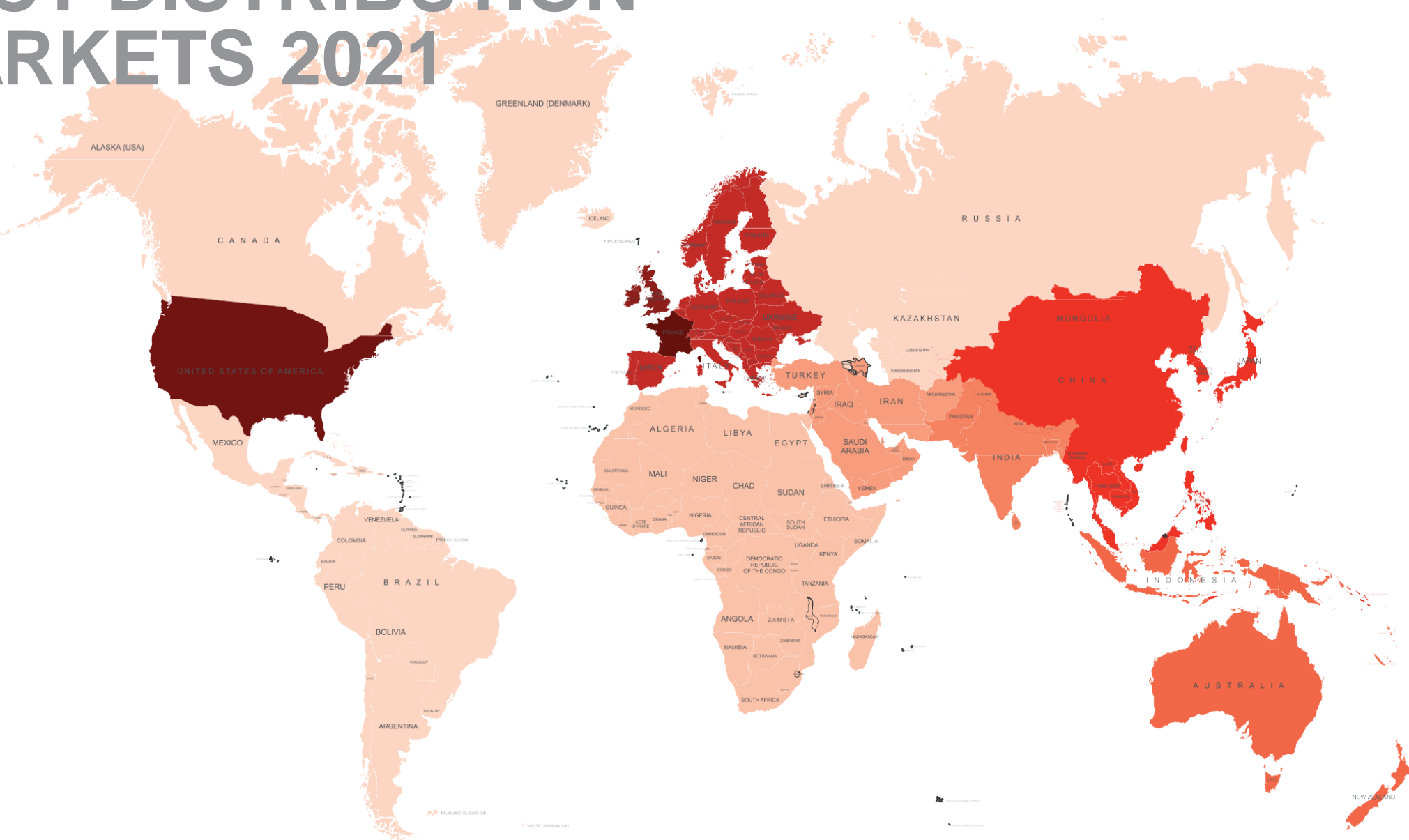
TICKETING/OBC INTEGRATION





PRODUCT DISTRIBUTION KEY MARKETS 2021

● France	25%
● USA	16%
● UK	14%
● Other Europe	25%
● Far East	7%
● Australasia	5%
● India	1%
● Middle East	3%
● Africa	2%
● ROW	2%





WARRANTY AND CUSTOMER SUPPORT



- ❖ Hanover offer 10-year parts warranty on all LED displays and controllers as standard; 2 years on TFT displays and HTC
- ❖ Training programmes offered to all customers FOC.
- ❖ Faults can often be fixed by the end-customer replacing parts under our warranty replacement scheme, reducing vehicle downtime.
- ❖ Online support also available, plus direct hotline to our Technical Support dept.
- ❖ Over 100 sales and service personnel around the world
- ❖ Every key export market is supported with local Hanover representatives, including technical service engineers. They are all fully trained and supplied with a stock of parts and finished products, ensuring any faults can be quickly diagnosed and resolved.

FUTURE PLANS

- ❖ Expand existing markets with particular focus on Germany, Scandinavia & Italy.
- ❖ Significant growth potential in USA.
- ❖ Look to build more partnerships with other on-bus equipment suppliers (APC, CCTV)
- ❖ New product development:
 - RGB variants of our high resolution displays
 - “Next Stop” type displays for high resolution side signs
 - Hanover Cloud, web-based software platform
 - New range of static (roadside) LED displays
- ❖ Expand existing facilities in Germany to provide central EU repairs facility
- ❖ EU-based manufacturing/assembly facility
- ❖ Looking to invest in a larger US production facility





WHY CHOOSE HANOVER DISPLAYS?

- ❖ More than 35 years of industry experience – Hanover is a well-established and trusted supplier
- ❖ Private ownership and financially independent.
- ❖ Strong balance sheet and zero debt
- ❖ Full in-house manufacturing ensures control of our production costs, quality and delivery times
- ❖ Investment in our own production facilities
- ❖ Well-connected with network of subsidiary companies, sales and service agents around the world
- ❖ Well-earned reputation for excellent customer support backed by industry-leading warranties
- ❖ Preferred destination display supplier to all major UK & ROI bus operators, as well as many overseas transport operations
- ❖ Hanover's business philosophy – retain profits for investment in the business, keep innovating, flat hierarchy



THANK YOU
ANY QUESTIONS?