



IN-FLIGHT ENTERTAINMENT

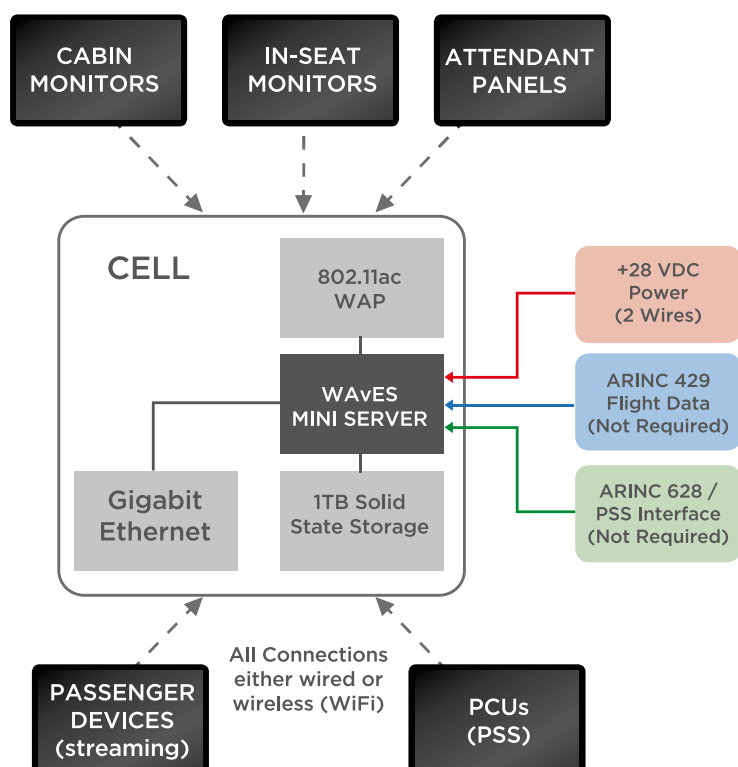




WAVES CELL

Business Class remote control
with integrated PCU

Use your own devices



KEY FEATURES

- > EASA and FAA Certified
- > The smallest installation footprint and AOG time in the industry
- > Remarkably small package weighing just over 1840g (4lbs)
- > Each CELL requires just 2 wires, i.e. +28 VDC power supply
- > WAVES supports all main Digital Right Management (DRM) schemes
- > Browser-based access without any need for downloading additional applications

INTRODUCING WAVES

The One-Box Solution for IFE Retrofit

WAVES stands for **Wireless Avionics Entertainment System** and is a comprehensive EASA and FAA certified IFE and PSS platform by Northern Avionics.

WAVES was designed to provide the smallest installation footprint and AOG time in the industry. The core system consists of one or more units called CELLS which include:

- A state-of-the art tri-band IEEE 802.11ac WiFi Access Point with six local or remote antennas
- An 8-core server
- 1 TB solid-state storage
- Multimedia streaming to all cabin
- Browser-based access without any need for downloading additional applications
- Support for virtually any Satcom and 3G/4G Internet modem
- ARINC 429 interface (e.g. for flight data)
- ARINC 628/RS485 transceiver (e.g. for PSS)
- RS232/CAN bus support for other cabin interfaces and remote control

All of this is put together in a remarkably small package, i.e. 318 x 160 x 60mm (12.5" x 6.3" x 2.4") weighing just over 1840g (4lbs).

Narrow-body aircraft installations require 1-2 CELLS while wide-body ones typically require just 3-4 CELLS. As all CELLS are identical, more CELLS means more redundancy for the system since the IFE would be capable of continued operations even with one single CELL left active.

Each CELL requires but 2 wires, i.e. +28 VDC power supply, to deliver Web access and multimedia streaming to the whole cabin.

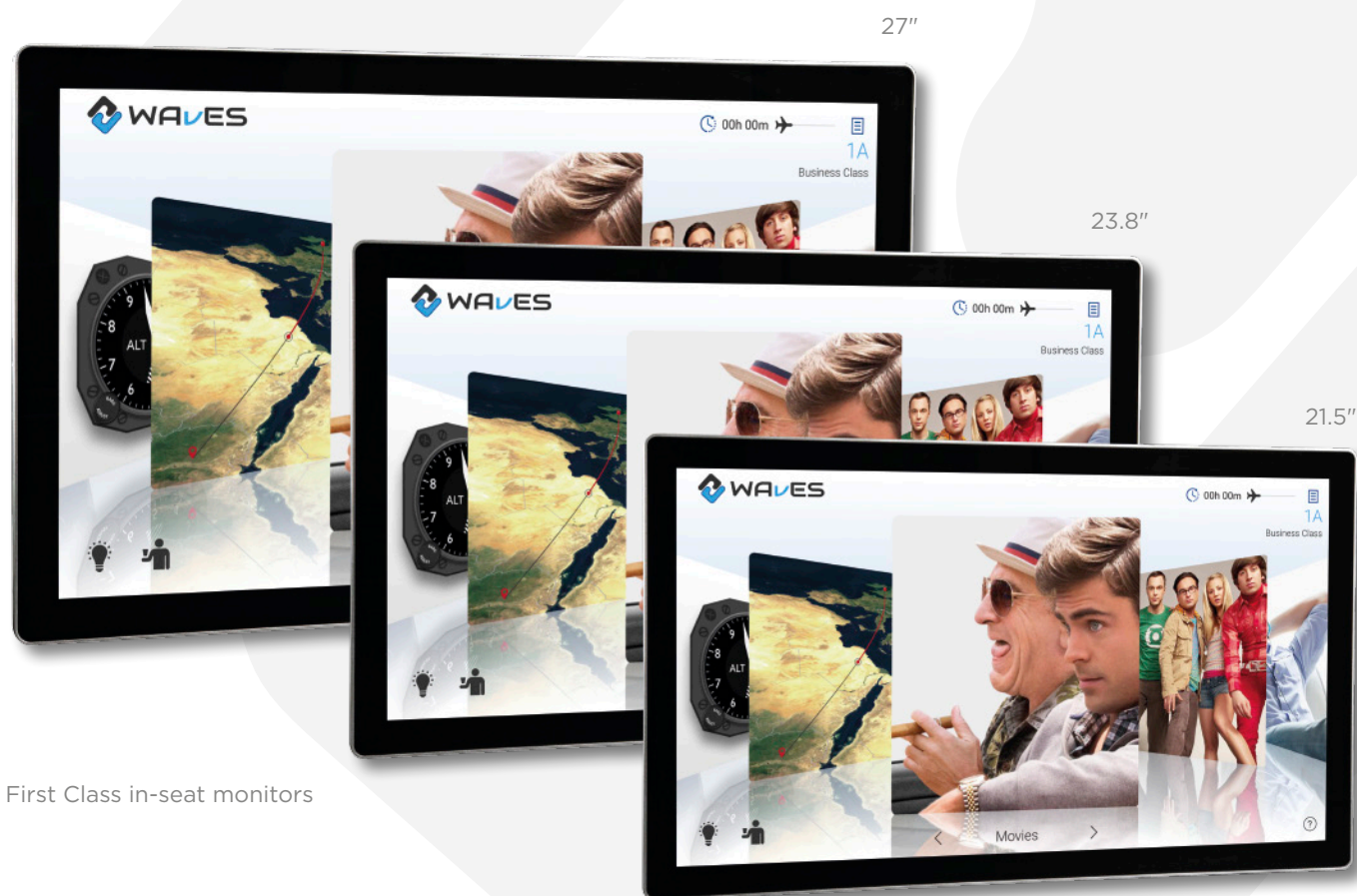
This means negligible AOG time during installation; retrofitting an aircraft has never been easier.

WAVES supports all main Digital Right Management (DRM) schemes and content from all major Hollywood studios, including Early Window Content.

WAVES also directly supports non-Studio content such as company videos, Welcome-On-Board loops or company advertisements. All of this content can be managed directly by the user via standard FTP without any third parties being involved in the process and with zero additional fees.

WAVES completed its first STC on Boeing B767-300 in 2016 and is being deployed on national airlines worldwide.





First Class in-seat monitors

KEY FEATURES

- > Supports in-seat monitors, passenger devices or any mixed scheme
- > Ultra lightweight wired or wireless smart monitors
 - 4K resolution (UHD)
 - Wide range, from 10.1" to 27.0"
 - Suitable for seat-back, cabin monitor, crew panel or VIP
 - HDMI input and HDMI output
 - 3G/4G connectivity
- > Ultra lightweight PSS solution for wide-body aircrafts
 - A full B767-300 PSS system weighs less than 25-30kg (55-66lbs)
- > Monitor Installation requires just 2 wires for power

IN-SEAT AND CABIN MONITORS

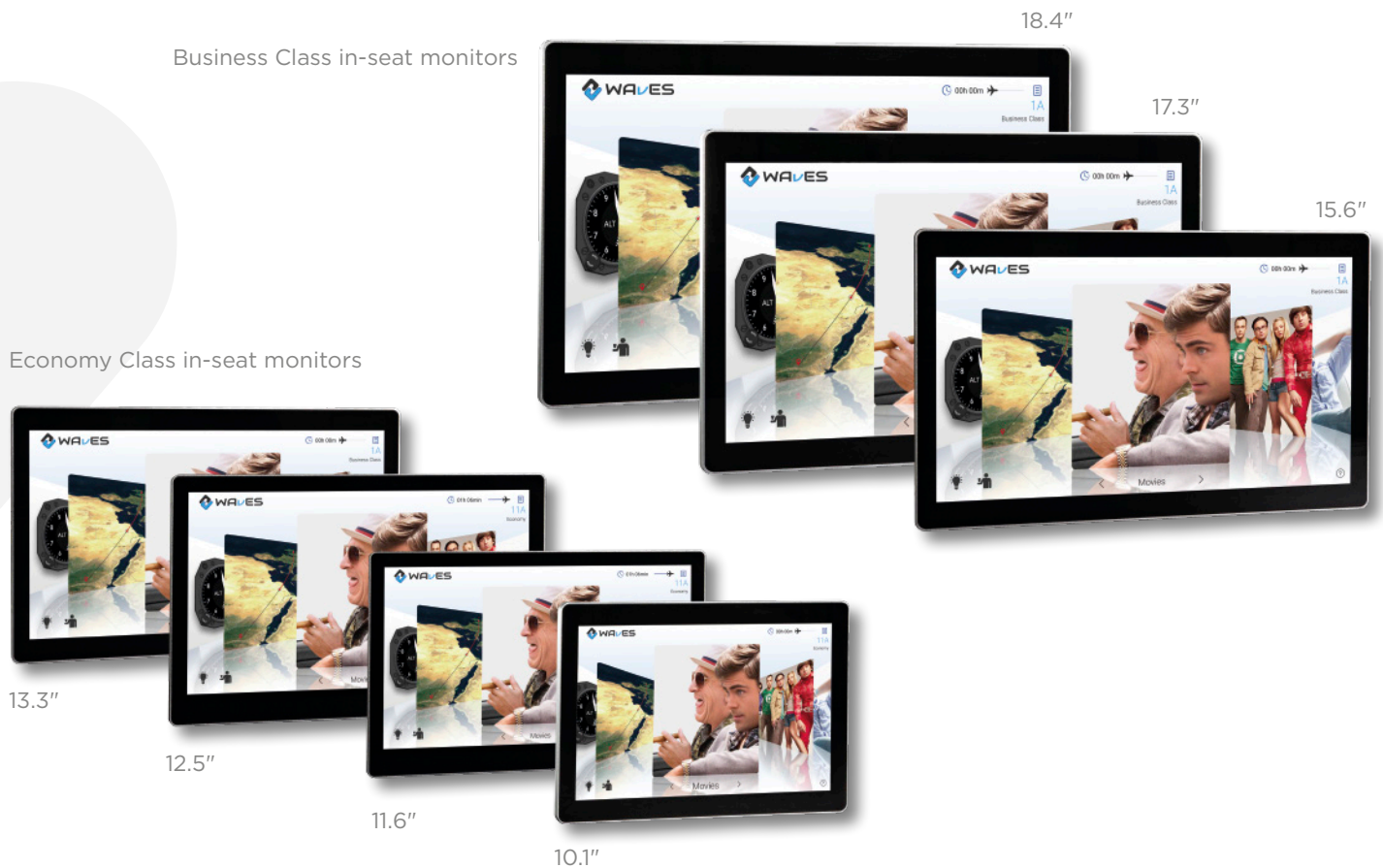
All WAVES displays are ultra-thin and ultra-light smart touch screen UHD (4K) monitors with remote control and PSS on-screen support.

Each monitor can be configured as an in-seat display for First, Business or Economy class, as a crew control panel or as a conventional cabin monitor, e.g. bulkhead-mounted or over-aisle.

The WAVES monitors are remarkably light, which means significant weight savings for the entire installation. Each monitor includes optional HDMI input and output to connect additional sources and an optional 3G/4G cellular module for Internet connectivity.

Similarly to the CELLS, the WAVES monitors support both wired (Ethernet) or wireless (WiFi) operations. This means exceptional flexibility and a substantial reduction in installation costs and AOG time.

We currently offer a variety of standard sizes between 10.1" and 27" for commercial airlines and we can custom design larger screens for luxury or VIP/Corporate configurations, e.g. 42-60".



UPGRADE EXISTING CABIN MONITORS

Existing monitors connected via Composite, VGA or HDMI can be seamlessly connected to WAvES using a small additional module and involve nearly no costs in terms of wiring and installation. Maps, content and all WAvES features can be displayed on all cabin monitors without having to replace them, and with significant cost savings.

PASSENGER SERVICE SYSTEM (PSS)

WAvES offers a full PSS solution for wide-body aircrafts and can seamlessly interact with both token-ring and ARINC 628 based systems without any need for Seat Electronic Boxes (SEB). WAvES also offers a miniature Passenger Control Unit (PCU) which can replace existing PCUs with barely any modifications to the seat armrest. The PCU can also be custom-designed to share the same Fit-and-Form of the existing PCU for seamless retrofit.

All WAvES PCUs are extremely light, weighing approximately 100g each (~3.5oz). This means that a typical B767-300 WAvES PSS installation weighs less than 25-30kg (55-66lbs) excluding cables.

USB CHARGERS AND CABIN POWER

WAvES currently offers a cabin USB charger solution and soon also an AC in-seat power solution for both Economy and Business class. This makes WAvES a one-stop solution for all IFE cabin requirements for any aircraft.



PSS Head Unit (PHU)

Economy Class PCU



BUSINESS CLASS 17.3" MONITOR AND CONTROLLER



BUSINESS CLASS IN-SEAT MONITORS



ECONOMY CLASS PCUs

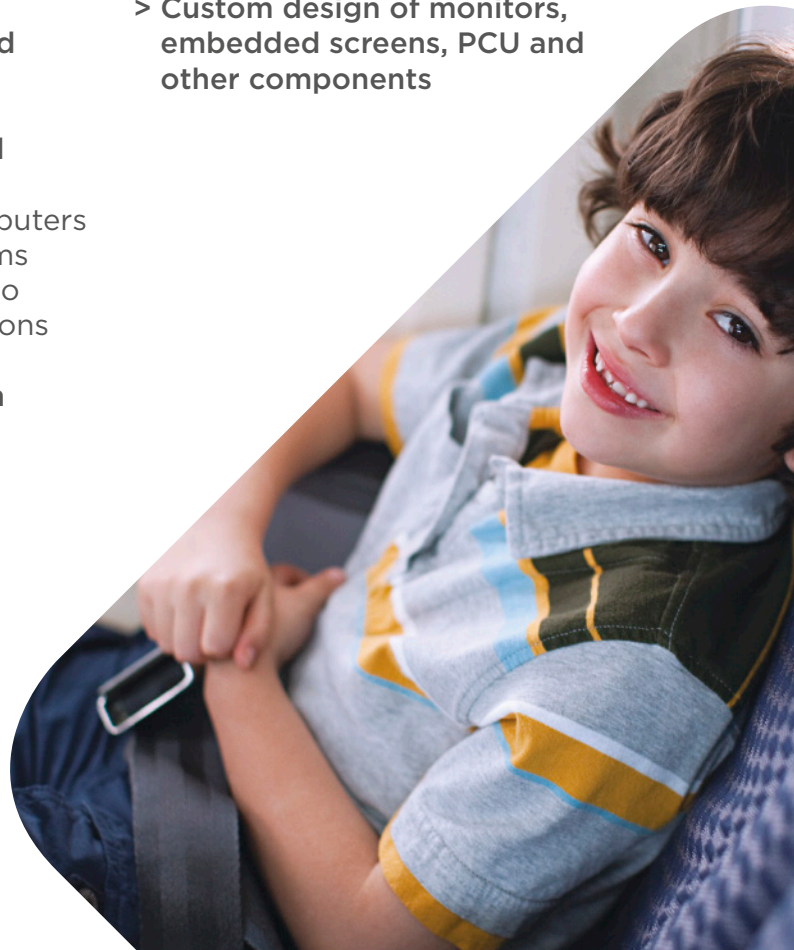


OVER-AISLE AND BULKHEAD MONITORS



EASA & FAA CERTIFIED

- > **Minimal installation footprint, installation costs and AOG time**
 - Install any component with just 2 wires for power. The rest is wireless
- > **Remarkably light**
 - A 2-CELL system (narrow-body) is less than 10kg including antennas and FAP
 - A 4-CELL system (wide-body) is less than 15kg including antennas and FAP
- > **Fully Redundant**
 - Each CELL is a stand-alone IFE on its own
- > **Supports in-seat Embedded Screens for First, Business and Economy class**
- > **Works with passenger-owned devices** such as tablets, smartphones and laptop computers using various operative systems by various vendors. No need to download additional applications
- > **Wired or wireless smart cabin monitors**
 - Bulkhead, over-head, over-aisle, foldable
- > **Can connect to existing cabin monitors using Composite, VGA or HDMI interface**
- > **Content management through standard FTP**
 - Customer has full autonomy in loading, offloading or modifying any content without third-party intervention and zero additional fees
- > **Lightest PSS System in the industry**
 - Typical B767 hardware is less than 30kg (66lbs)
- > **Full in-seat USB power solution**
- > **Custom design of monitors, embedded screens, PCU and other components**





NORTHERN AVIONICS

Milan Linate Prime Airport (LIML) Viale dell' Aviazione 65, 20138 Milan (Italy)
www.northern-avionics.com