The "Internet of Things" Afloat

by Digital Yacht

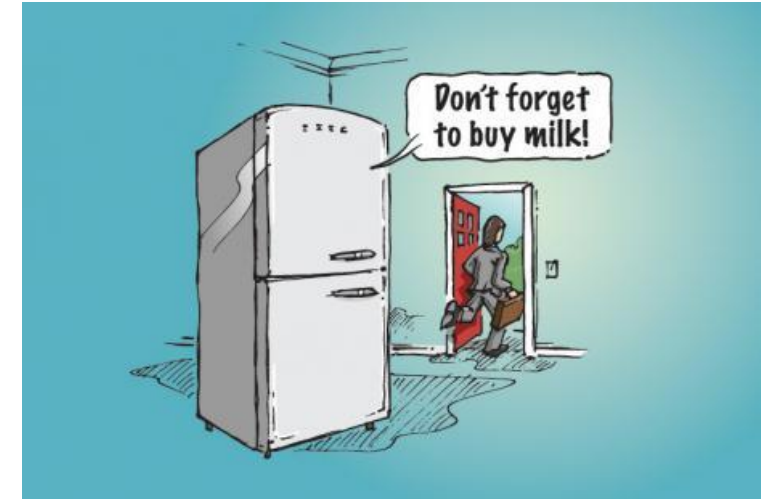DIGITAL YACHT

What is the "Internet of Things" ?

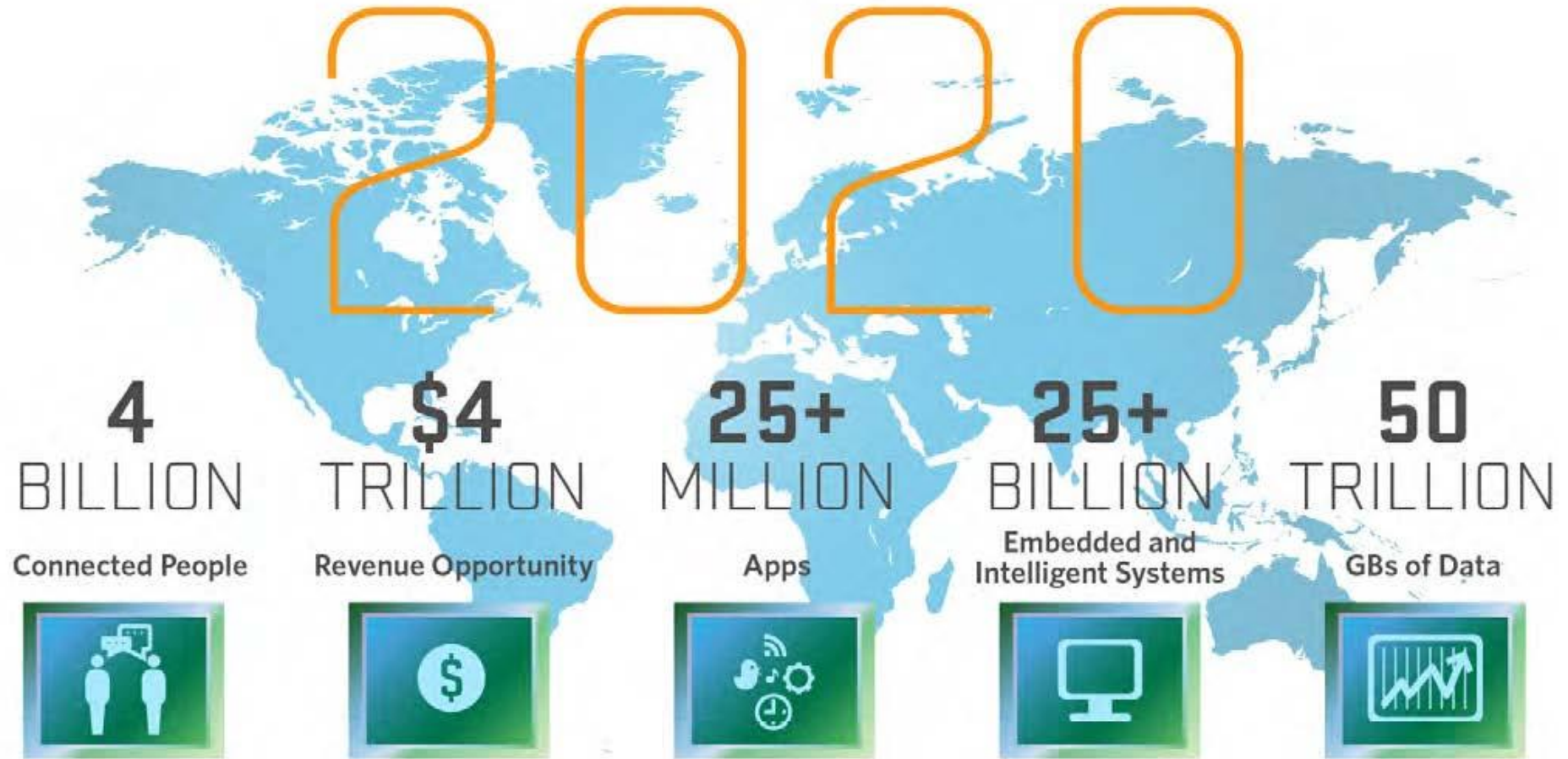**The Internet of Things (IoT)….**

"A proposed development of the Internet in which everyday objects have network connectivity, allowing them to send and receive data."

The Classic "Internet of Things" Example

Don't forget to buy milk!

- The Internet of Things covers an extremely wide variety of devices and applications but the classic example is "the smart fridge"

- Any sensor or device connected to the internet and sending information to other devices or a cloud server is part of the "Internet of Things"

- An actual marine example…. Digital Yacht's Sonar Server + Navionics App collecting crowd sourced Depth data

$SDDPT,18.43,0.00*69
$SDDBT,60.46,f,18.43,M,10.07,F*0A
$GPGLL,5330.25,N,00215.31,W,134531,A*2D

Navionics' Servers

"IoT" is going to be big…

4 BILLION	$4 TRILLION	25+ MILLION	25+ BILLION	50 TRILLION
Connected People	Revenue Opportunity	Apps	Embedded and Intelligent Systems	GBs of Data

Source: Mario Morales, IDC

The Connected Boat…

- The "Internet of Things" needs an Internet connection

- Internet connections on boats are transient

- There are traditionally 3 methods of connecting a boat to the internet…

	Wi-Fi	3G	Sat
Range (typical)	1 Mile (from Hotspot)	10 Miles (from Array)	Unlimited
Coverage	Large Marinas and Towns	Good in Towns and Cities	Worldwide
Speed	> 1Mb/sec	0.2-5Mb/sec	2Mb/sec
Cost (typical)	£5 per day (unlimited)	5p/MB in UK (£3.07/MB Euro)	$1.99/MB (VSat)

3G/4G

Satellite

Wi-Fi

We all have the Internet in our pocket !

Latest Mobile Device Statistics

>1.5billion devices
>1.5m activations daily

PLUS
>250m iPads since 2010
13m new iPhones in 3 days

The Future of Mobile 3G, 4G (and 5G)

- Global roll out of mobile broadband is continuing at a fast pace

- More and more areas where you can get connection

- Reduction in European roaming charges

- London to be one of the first 5G cities (by 2020)

- It is going to continue to get better and better

Let's be part of the "IoT"

So, we have…

- A Boat
- An Internet connection (albeit temporary)
- A set of Devices and Sensors
  (Instruments, Engine Gauges, MFDs, Autopilots, DSC Radio, GPS, etc.)

- So let's start transmitting and receiving data…

NMEA Data Standards

National Marine Electronics Association

- The NMEA0183 standard is over 30 years old and even the "latest" NMEA2000, as the name suggests, is over 15 years old

- Both standards have proven very "fit for purpose" and will continue to be used for many years to come

- Neither 0183 or 2000 are data formats suited to this new mobile and internet enabled world that we find ourselves in

- Developers that wish to use NMEA data, must join the NMEA, purchase the specifications, test tools, manufacturer code, product codes, etc. and this can add up to thousands of dollars

Signal K the Open Data Format

- A few years ago, a group of software developers, with a love for boating decided to create a new, modern, open data format for boats

- The name Signal K comes from the blue and yellow Maritime Signal Flag (K – Kilo), which means "I Wish to Communicate with you"

- The Signal K data format is based on JSON, the most popular method of communication between web apps and web servers

- Any developer can find the free specification on the Signal K website and start developing their own Signal K apps and services at no cost
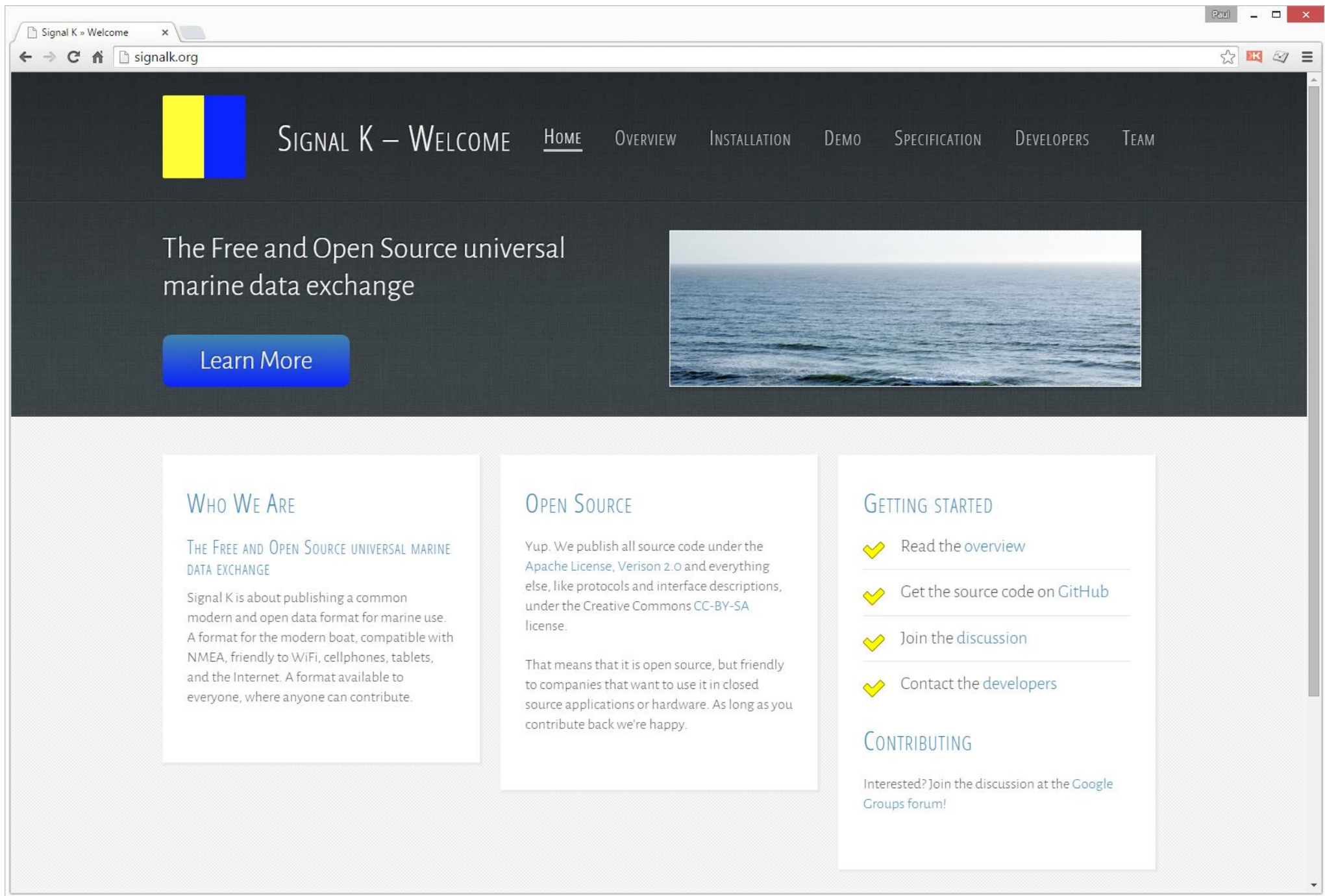
SIGNAL K – WELCOME

The Free and Open Source universal marine data exchange

Learn More

WHO WE ARE

THE FREE AND OPEN SOURCE UNIVERSAL MARINE DATA EXCHANGE

Signal K is about publishing a common modern and open data format for marine use. A format for the modern boat, compatible with NMEA, friendly to WiFi, cellphones, tablets, and the Internet. A format available to everyone, where anyone can contribute.

OPEN SOURCE

Yup. We publish all source code under the Apache License, Verison 2.0 and everything else, like protocols and interface descriptions, under the Creative Commons CC-BY-SA license.

That means that it is open source, but friendly to companies that want to use it in closed source applications or hardware. As long as you contribute back we're happy.

GETTING STARTED

✓ Read the overview

✓ Get the source code on GitHub

✓ Join the discussion

✓ Contact the developers

CONTRIBUTING

Interested? Join the discussion at the Google Groups forum!

Signal K Format

- Signal K is based on JSON – JavaScript Object Notation that is at the heart of HTML5

- Similar to XML, JSON is leaner and more efficient as a data-interchange format

- JSON is human readable, much like NMEA0183 but uses full name tags, so you do not have to remember three letter sentence IDs

- The example opposite is the Navigation data; Position, COG, SOG and Heading for a vessel

- Signal K Data can be polled by using the standard restAPIs in Http: or streamed by opening a websocket

```
{
  "vessels":
  {
    "self":
    {
      "navigation":
      {
        "position":
        {
          "timestamp": "2015-09-20T18:48:31.000Z",
          "latitude": 47.657955169677734,
          "longitude": -122.44184875488281,
          "altitude": -122.44184875488281,
          "source":
          {
            "label": "self",
            "type": 2,
            "src": 2490369,
            "pgn": 129029
          }
        },
        "headingMagnetic":
        {
          "value": 334.954803467969
        },
        "courseOverGroundTrue":
        {
          "value": 342.01708984375
        },
        "speedOverGround":
        {
          "value": 3.43999981880188
        }
      }
    }
  }
}
```
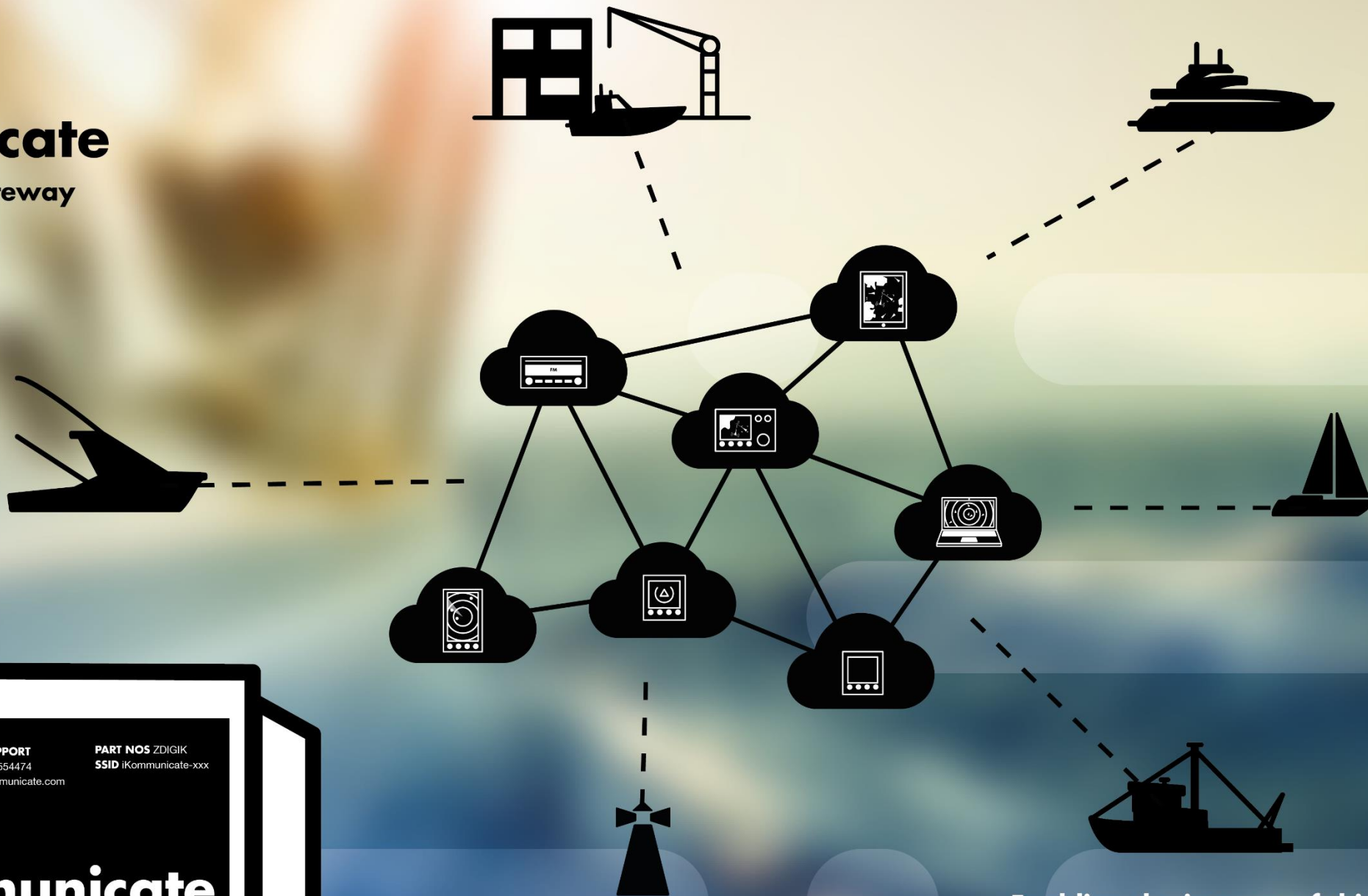
Closed NMEA meets Open Signal K
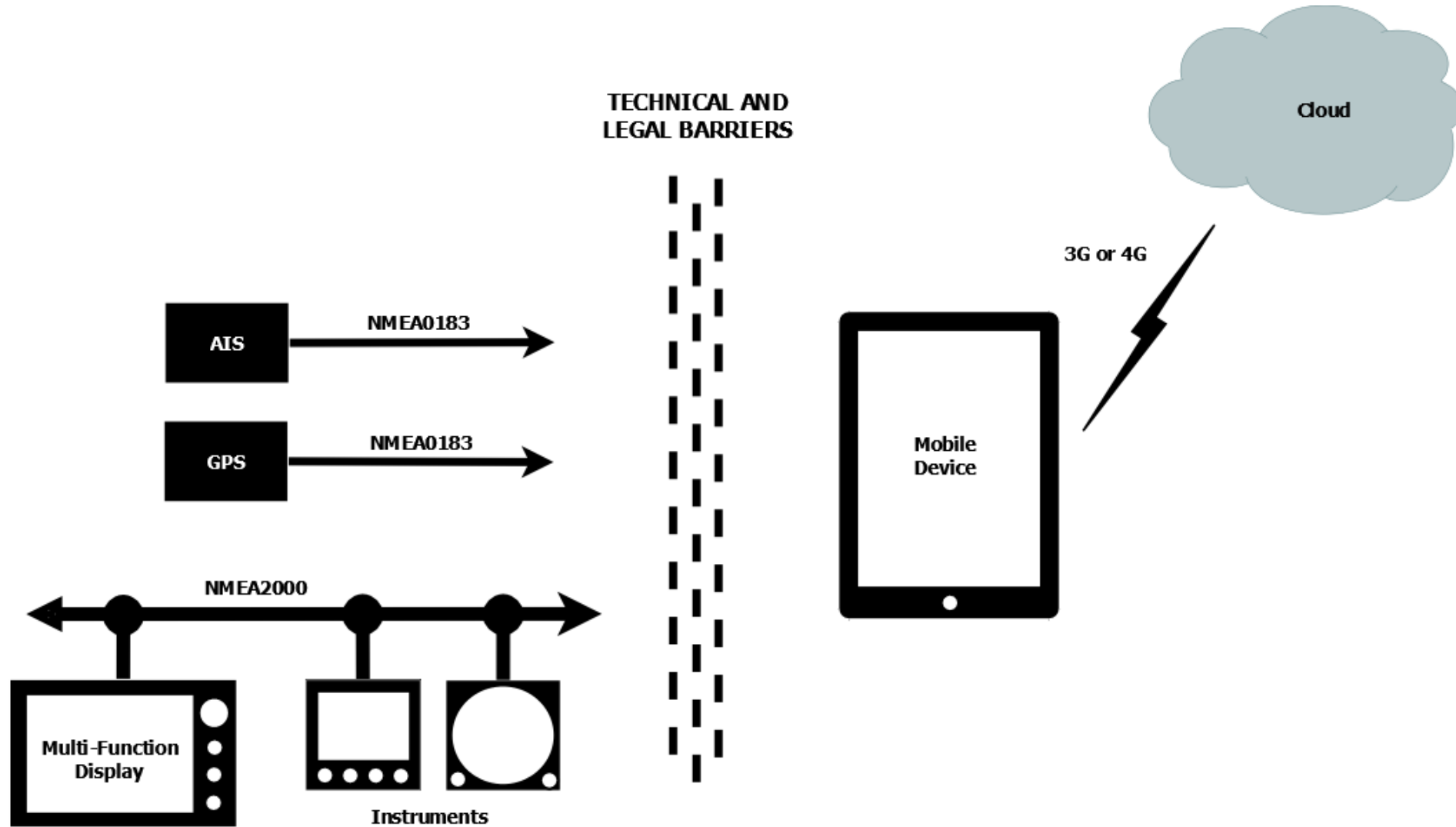
Product – iKommunicate Signal K gateway

- iKommunicate features
  - 2 x NMEA 0183 Ports
  - 1 x NMEA 2000 Port
  - SD Card for Logging
  - Simple Web Server
- A Gateway between the closed NMEA world and the Open Signal K world
- RJ45 wired Ethernet connection to boat's network
- NMEA 2000 certified

iKommunicate System

- iKommunicate forms a data gateway between the NMEA network and the Ethernet Network

- RJ45 wired Ethernet connection to wireless router

- The NMEA 2000 network integrity is maintained as iKommunicate is certified

- Signal K data can be sent to the Cloud via an App on the mobile device
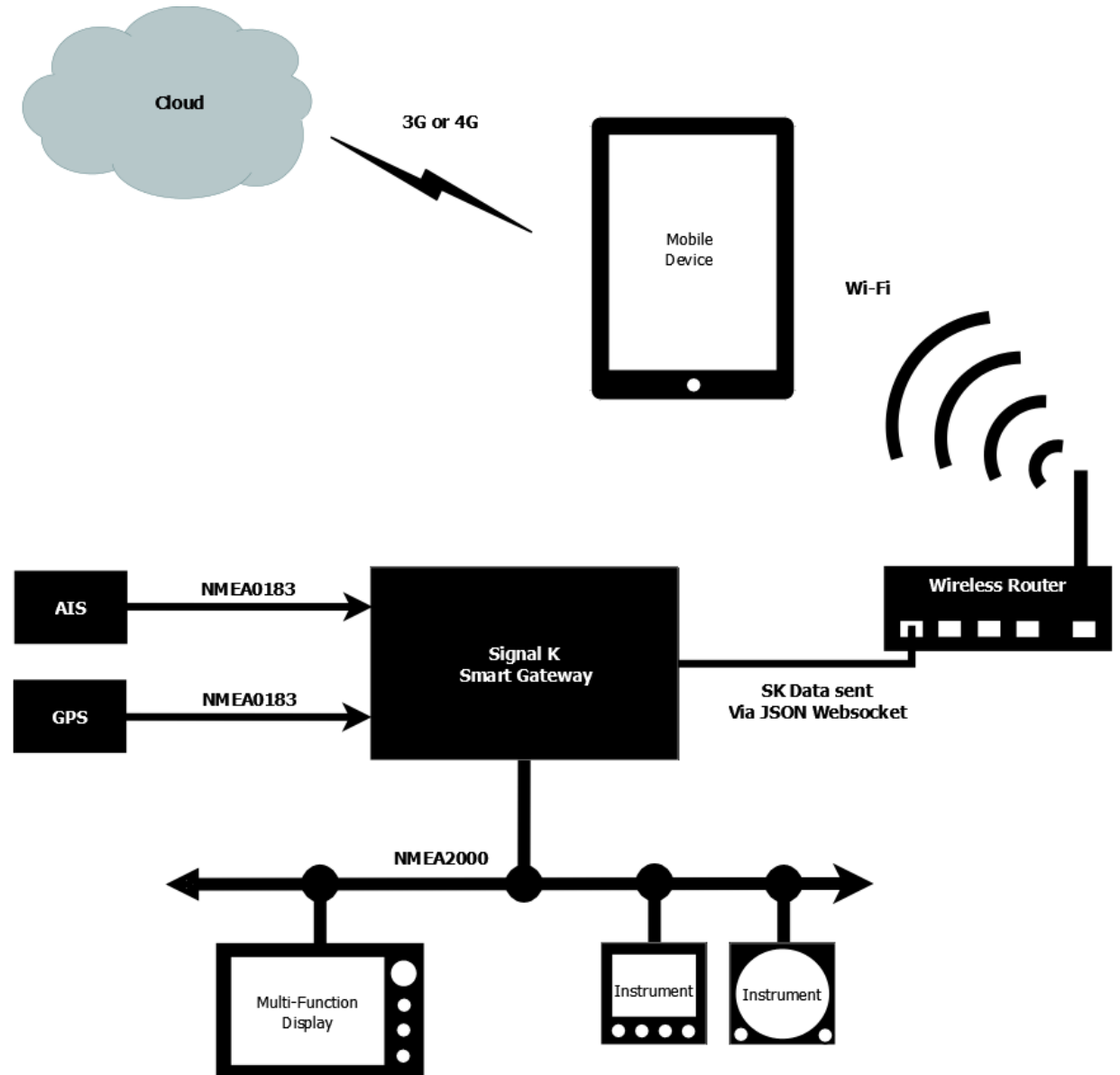
KICKSTARTER

- Digital Yacht has just gone live with the first Kickstarter campaign launched by any marine electronics company

- The success of Signal K and iKommunicate will depend upon early adoption of the gateway by developers

- The Kickstarter campaign will put Digital Yacht in direct contact with the developers and early adopters, providing valuable feedback

- Developers/Early Adopters get lower pricing and first deliveries for investing in the new technology
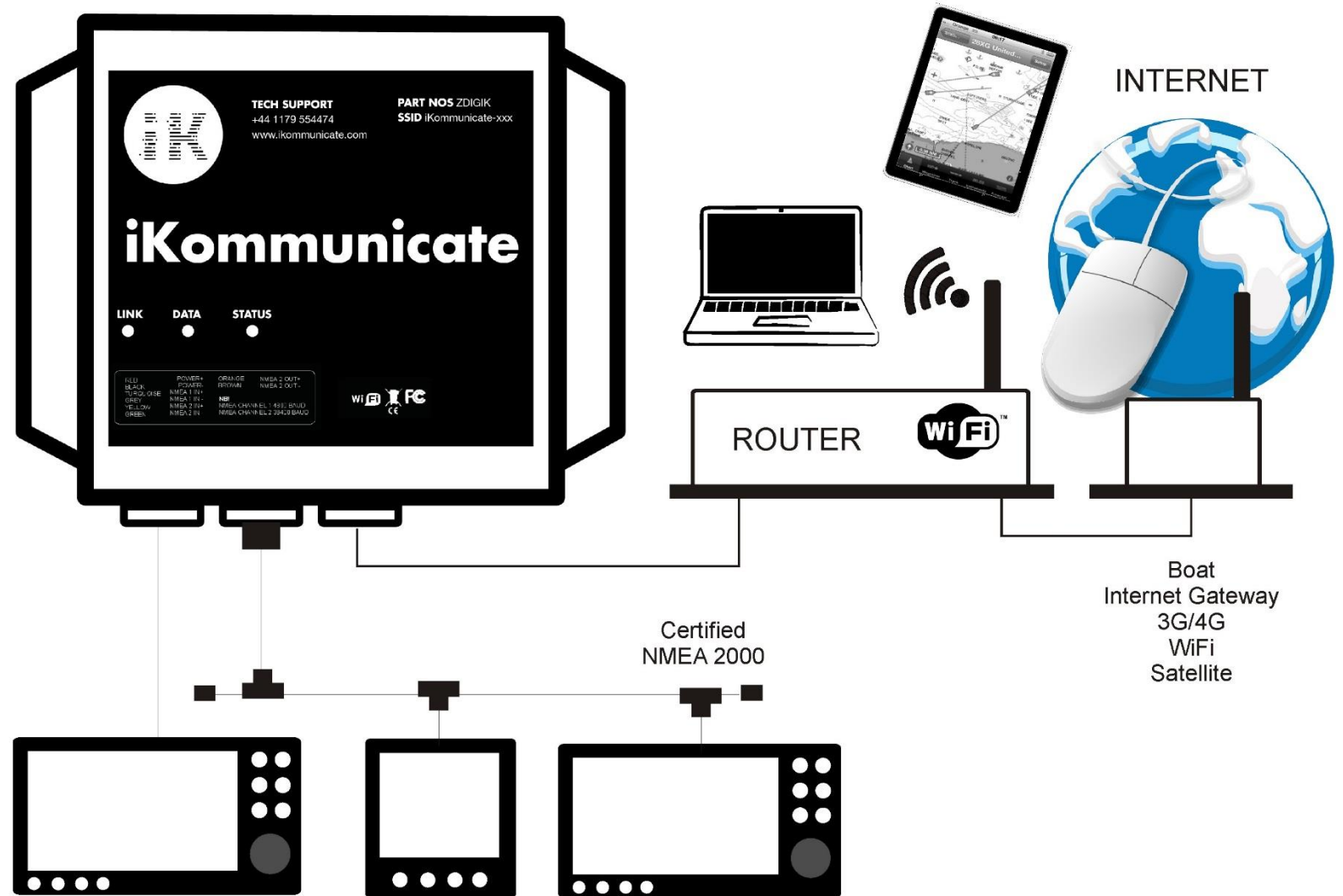
Visit http://ikommunicate.com for more information

Typical Installation

Most early adopters of Signal K technology will already have an on board wireless router for existing connectivity

iKommunicate will connect with a simple network cable direct to the LAN port of the router to share the existing network and internet connectivity if available

Interfaces are available for 2 x NMEA 0183 and 1 x NMEA 2000

Application

App can be used for navigation with additional functionality offered thanks to internet connectivity through the mobile device. For instance "TWEET" boat status or track my buddies

iKommunicate server provides real time feed of boat data to the iPad app via the router

Key issue is easy JSON string of data which allows fast, cheap and simple app development

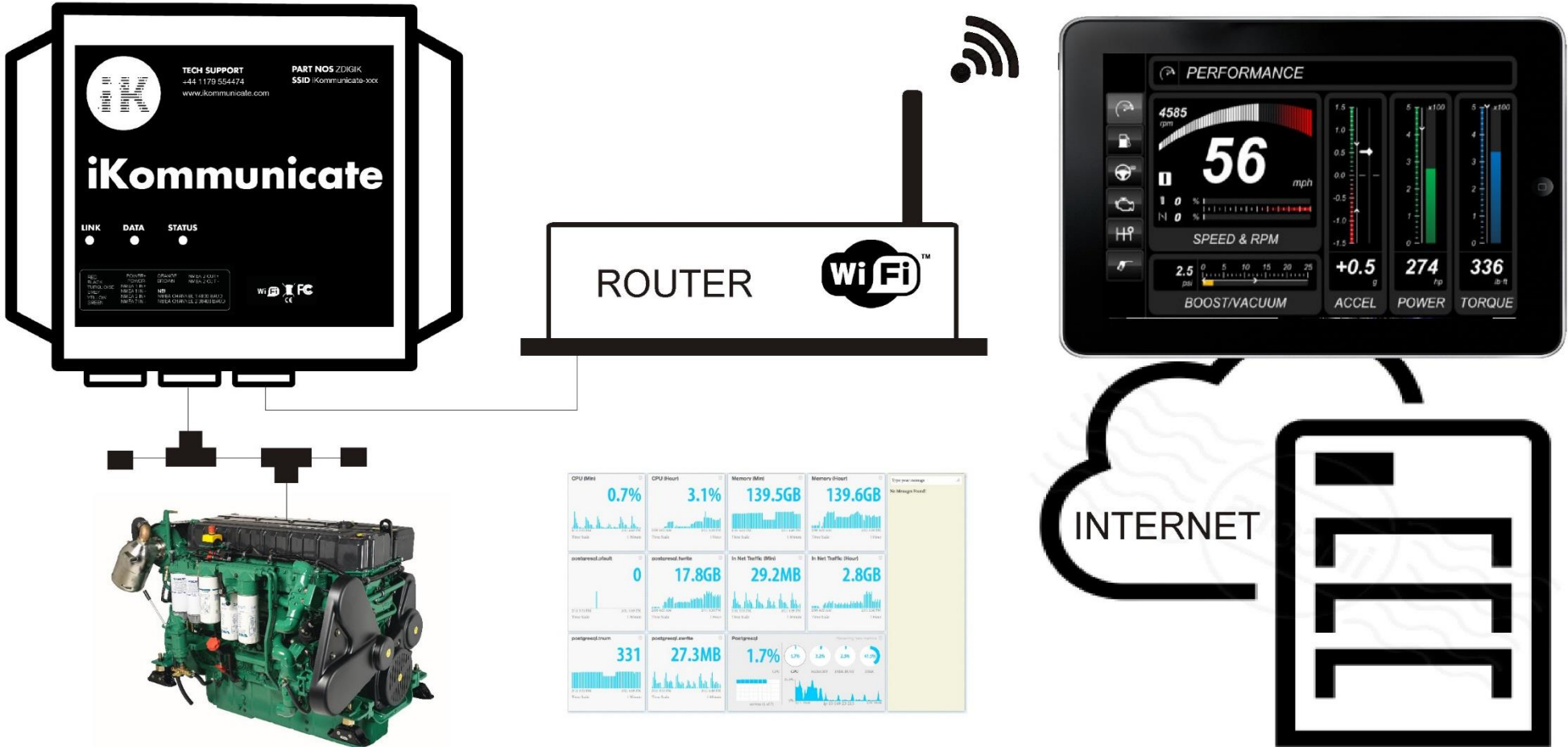**Internet**

@yachtsignalk
David Smith

Yacht Signalk Call Sign MMNZ7 currently at 51:27.30N 2:35.56W 8.2KTS, HEADING 320. WIND SPEED 18KTS, ETA destination 42 MINUTES #raftupparty
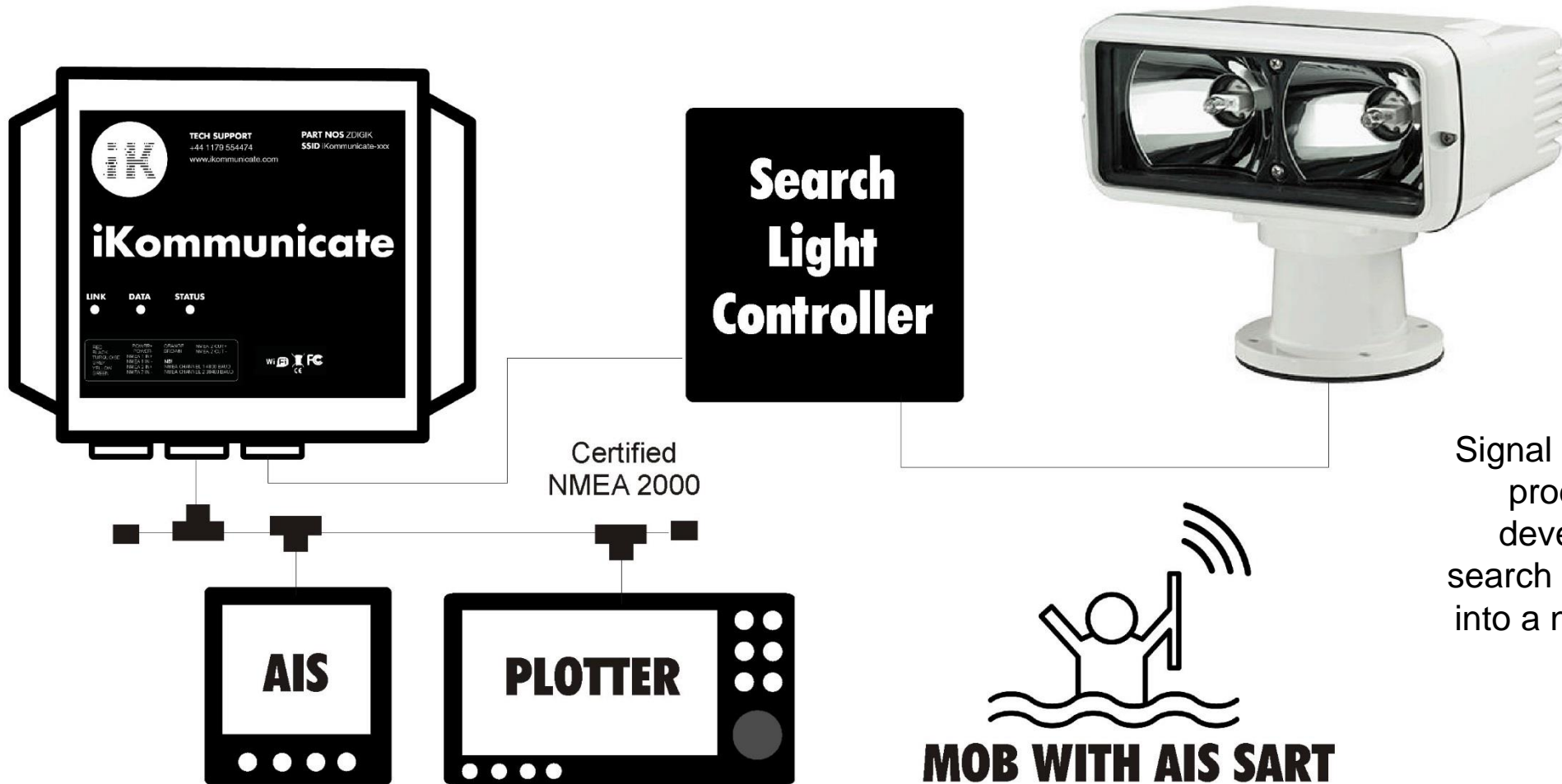
3 minutes ago via web

Simple tweet sent – could be a private direct message, a location tweet to all your followers or a feed to a cloud based server

Application

Boat engine interfaced to Signal K gateway and on board iPad used to display engine status, fuel flow, optimised economy etc. Data stored on iPad and uploaded to Cloud server when required. Data analysed by engine manufacturer and custom service profile developed

Application

iKommunicate

TECH SUPPORT
+44 1179 554474
www.ikommunicate.com

PART NOS ZDIGIK
SSID iKommunicate-xxx

LINK   DATA   STATUS

Certified
NMEA 2000

Search Light Controller

AIS

PLOTTER

MOB WITH AIS SART

Signal K interfaces for existing products will be easy to develop. For instance, a search light could be integrated into a navigation system to aid a MOB rescue

Application

Certified NMEA 2000

BELKIN WEMO
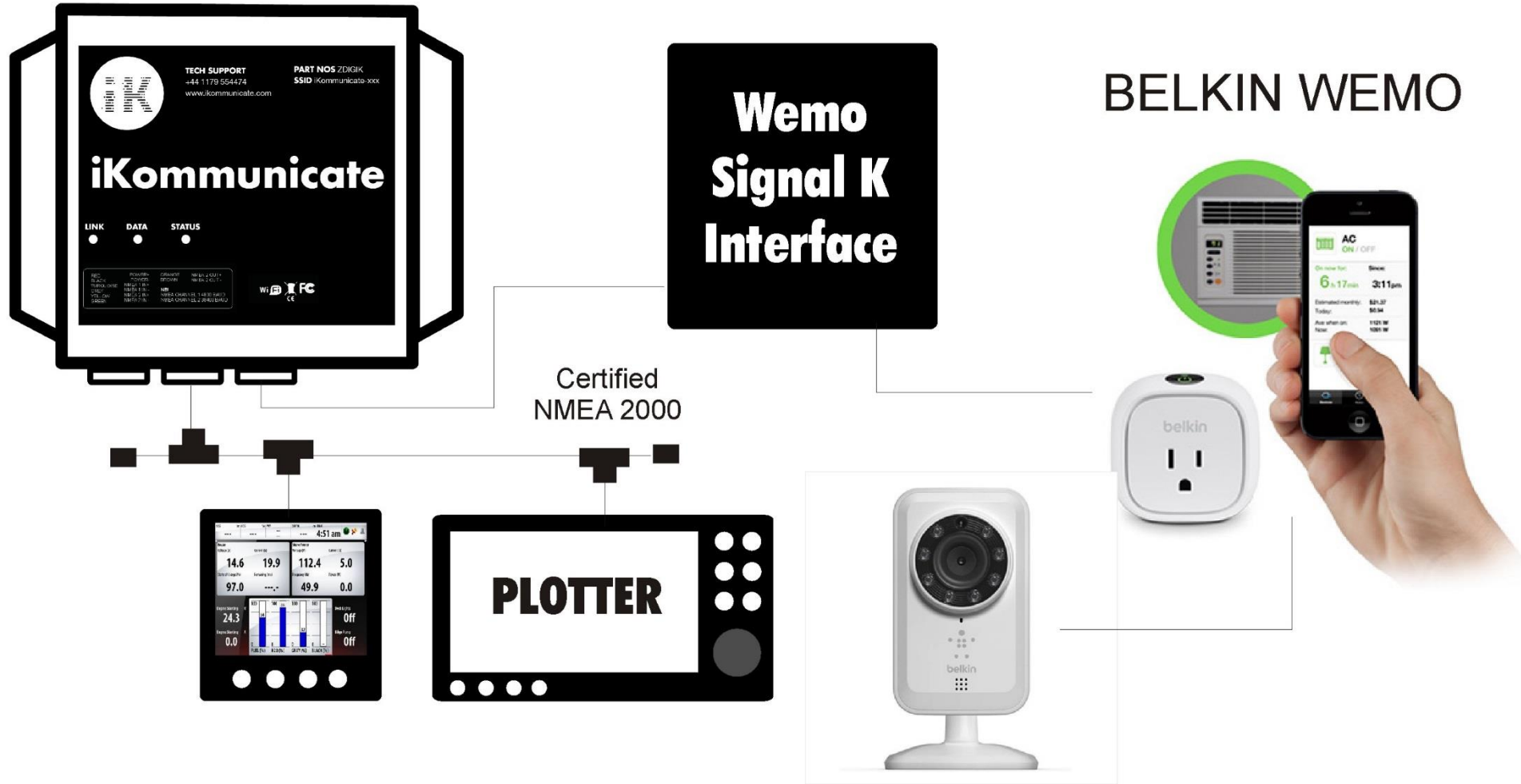
Wemo is a low cost system manufactured by consumer giant Belkin, that allows a smart phone to control AC appliances, dim lights and provide video security.

Wemo development is relatively simple and Signal K would be an ideal way to integrate traditional marine electronic displays into the system for control and data viewing

Summary

- The "Internet of Things" promises to allow devices to be globally connected together
- Despite technical challenges, boats will be part of this new "IoT" world
- Existing NMEA0183 and NMEA2000 data formats are not mobile or internet friendly
- Signal K is a new, modern, web-ready, open data format
- Digital Yacht are developing iKommunicate as a gateway to convert NMEA data to Signal K data
- The Kickstarter campaign is now live for developers and early adopters to invest in and be part of this new technology
- Many new Signal K applications and services will be released as the barriers for developers disappear, encouraging innovation and creativity