The Customer
The customer serves tens of millions of customers in North America and is one of the world’s largest communication technology companies. They are leaders in deployment of next-generation wireless networks, internet services and introducing new wireless technology. In this case the technology offering is a set-top box product (STB).

This customer engaged Cobham Wireless urgently seeking consultancy for the manufacturing test of a new set-top box covering both RF and multimedia interfaces. Their problem was that they did not have the in-house knowledge, expertise and resourcing to deliver the new design as well as the test engineering requirements to take the product to market quickly and efficiently.

With these in mind, a test engineer may question:
- What test equipment can test all multimedia interfaces and new RF technologies?
- What test plan is appropriate?
- Will I need to change my test approach?
- How quickly can I test these test items?
- How will the solution fit with my existing test software and manufacturing processes?

The resultant requirements placed on engineering and manufacturing departments is to deliver a faster test station, better specifications, with smarter approaches to test, test flow and enhanced test flexibility. The customer presented Cobham with these problems, requiring a test strategy for their new design for both RF and multimedia test. The solution required had to be:
- Proven reliable, low risk
- Cost effective
- Future proofed
- Simple to operate
- Low impact in terms of footprint, integration complexity and production flow

The customer preferred to work with a single solution provider as opposed to working with numerous partners/test vendors. Upon consulting with Cobham on test needs, the customer requested a proof of concept (PoC) demonstration of the RF test within 3 weeks to reflect their aggressive timescales and time to market demands. They described their deployment plan and engagement with other partners including the contract manufacturers. Cobham made recommendations on a number of test platform options. The eventual solution was a turn-key RF and multimedia test station based on National Instruments (NI) modular instrumentation.
The Solution

The first milestone was to setup a PoC solution which demonstrated test of a leading chipset vendor integrating 802.11ac wave 2 features and Bluetooth 3.0. Cobham provided the customer with RF parametric performance with the new test system, test time estimates and a manufacturing test plan. Cobham on-site technical support increased the customer’s confidence and demonstrated the superior test time when compared with their current test equipment.

The multimedia test system features:

- A variety of NI modular test hardware supporting a range of industry standard digital/analog audio & video interface
- Media test using NI Audio/VideoMaster software
- Support for multi-DUT testing (up to 4) in conjunction with multiplexers and interface accessories

![Figure 1. Multimedia Test System](image1)

The RF test system features:

- A National Instruments Wireless Test System (WTS) configured with 8 integrated test ports, a single vector signal analyser and single vector signal generator
- Wireless connectivity test coverage
- Supports multi-DUT testing (up to 8)

![Figure 2. RF Test System](image2)
NI TestStand was chosen as the industry standard test management software and familiar to the contract manufacturer. The multimedia system combined all analog and video test in a modular form, taking advantage of PCI eXtensions for Instrumentation (PXI) architecture to increase test speeds through parallel test techniques on the device while decreasing test costs and overall footprint. This replaced older and more traditional test approaches of using multiple test instruments to cover all the test interface requirements, proving costly, less flexible and more complex.

The traditional approach to testing such a product in a production flow is to partition testing by the capabilities of the test equipment or by logical functions on the DUT itself. The customer could control all test RF and multimedia interfaces in parallel and therefore permit the equally capable test equipment to engage test at the same time. This allowed for parallel testing of interfaces on a board simultaneously, significantly reducing test times. Moreover, the test station could support test of multiple devices, allowing for increased test utilisation of the test equipment and eliminating effects of operator and device loading/booting.

![Figure 3. Cobham Multi-DUT & Parallel Interface Test Solution](image)

A system was subsequently deployed in the customer’s test lab in California, USA. Cobham assisted with integration of test hardware to the customer test fixture and control. The services requested extended to include system installation and commissioning services at their sub-contractors site in China to support a pilot volume run.

This was the customer’s first design with an expectation for further variations. The test station design took potential future requirements into account and can support the following additional test needs:

1. Cellular Technologies (e.g. LTE)
2. Internet of Things (e.g. Z-Wave, ZigBee)
3. TV Tuning (e.g. DVB-S, DVB-T)
4. Functional test
5. Source Measure Units and Power Suppliers
6. Automated fixture control
The Benefit

The Cobham solution offered the following customer benefits:

1. “One-Stop Shop”
   - Combined with engineering services to integrate both software and hardware into a manufacturing line, the customer had a “one-stop shop” for their testing needs. There was no need to work with multiple test vendors and partners.

2. Higher Productivity
   - PXI based hardware modules provided parallel test capability on the printed circuit board test interfaces. The test station supported multi-DUT testing. Together these features increased test equipment utilization and decreased test time.

3. Cost Effective
   - A single test station solution combining multiple test requirements and simplifying manufacturing flow

4. Low Risk
   - This project allowed the customer to transfer responsibility and therefore the risk of building a new generation of in-house test systems to experts in manufacturing test, as well as gaining the benefits of an experienced consultancy for their entire test needs and design.

5. Global Application Level Support
   - Cobham were able to offer a range of test expertise including functional, RF and multimedia test with local technical support. Cobham developed, commissioned and supported the product roll out in multiple geographic locations.

6. Future Proofed
   - The modular test station is equipped for evolving test needs and so reducing the risk of the investment.

Summary

In preference to specifying a new design and re-branding a product from a STB manufacturer, this project delivered the customer’s first in-house STB design and a product of strategic importance as part of a new market initiative of connected devices. The customer wanted to get to market quickly with a test solution catered for the specific RF and multimedia needs of their design. In the absence of experience in these areas of test, Cobham filled that gap by consulting on requirements and delivering a turn-key solution. This decreased risks on the customer, delivering reduced test times and testing multiple DUTs and interfaces in parallel, ultimately reducing cost of test for the new STB product.