

Thinking out the box

Communications designers are continually faced with a number of challenges and they are now required to make an array of different measurements when testing different communications technologies. These measurements are further complicated by the convergence of multiple technologies into mobile handsets. Designers must also contend with evolution in existing technologies as well as the emergence of new technologies – both of which make the job of the R&D engineer more complicated than ever before.

One area in particular where these challenges are felt is test. Here, technological complexity and compliance with industry standards is vital. Consider the design and development of a mobile WiMAX product; the standard and associated signal structure is so complicated that the design has to be just right for the system to work.

Therefore, designers need to verify the device performance accurately using the correct test equipment to create and

Whatever the application and technology, communications test and measurement providers are boxing clever. By **Mike Richardson**.

analyse real world mobile WiMAX signals with all their inherent complexity at the level of performance required for the system.

To address these challenges, innovation in both design and test is required to quickly move existing and emerging wireless technologies forward. This innovation is coming from design engineers who are continually working to push the limits of technology, as well as from the providers of test and measurement solutions.

One school of thought is that, by incorporating signal analysis and generation into one piece of equipment, multiple pieces of rf equipment on

the test bench can be eliminated to provide cost savings in system setup time as well as calibration. Furthermore, an integrated, 'single box' design can also reduce test bench space requirements and significantly improve housekeeping.

Anritsu's European business development manager Hiren Joshi says that as far as the spectrum analyser is concerned, the challenge facing the communications test industry is in moving from the analogue to the digital world.

"Communications designers want more data, faster data rates and easier access," he explained. "Whether it is with technologies such as long term evolution (LTE) or WiMAX, Anritsu sees a demand for a solution to test everything using just one box because of cost pressures involved."

According to Joshi, one instrument can address the needs of the manufacturing, R&D and the installation and test environments. "For example, the typical R&D test laboratory set up of a signal gen-

Illustration: Henning Lohlein





erator, a laptop computer and associated equipment, doesn't lend itself to portability. The manufacturing environment benefits from having everything in one box as it is lighter, more compact, has less cabling/wires and occupies less floor space in comparison to multiple instrument setups. Anritsu can address all these market needs by providing multiple technologies in one box."

However, Agilent's EMEA market initiative manager for wireless R&D, Renaud Duverne has a contrasting view. He suggests the challenge for test and measurement providers is that technologies like WiMAX and LTE are relatively new, so it's more difficult for providers to address the needs of R&D, manufacturing and installation and maintenance with just one box.

"These needs can be distinct and very different," he explained, "and it depends on the stage you are at in the design process when dealing with new tech-



nologies. R&D requires maximum flexibility with a full feature box approach, because the test engineer won't always know how things will pan out. To optimise components under test, the engineer will need more than one standard box, whilst in manufacturing, a smaller feature set will suffice because they don't need to run as many extensive tests; installation and maintenance require fewer still."

Duverne concedes the 'one box fits all' concept is applicable for advanced and mature technologies like GSM, but that there is too much

development work involved with WiMAX to completely answer all the R&D, manufacturing and installation and maintenance needs.

"Agilent is looking to introduce more compact offerings in the future as industry needs evolve and technologies like WiMAX become more defined and advance into the design flow, R&D and mass production. In terms of implementation and deployment, today's new technologies are very demanding and move faster than the legacy ones. To serve our customers, Agilent needs consistent offerings to keep apace with the industry's test requirements."

Jonathan Mees, Tektronix' rf test market development manager, says that as the proliferation of rf products continues, digital rf designs require more capability from traditional test equipment. New technologies are required to meet these demands and the challenge is in responding to them with a new generation of specifically designed measurement equipment.

"Within manufacturing test, there is a constant drive to reduce footprint, cost and manufacturing test runtimes," he revealed. "It's true that a large percentage of the manufacturing test cost is in the test equipment itself and in the time taken to run tests. In these areas, there are definite advantages to having a 'one box' test solution, but where this theory fails is when you make compromises in order to get these test measurements within the one box: either the box becomes too complicated to use in order to drive and program, or you end up compromising the actual measurement performance itself."

"Although specifications often exceed the conformance test requirements on the manufacturing line, the practicalities are that, if there is a problem and the test isn't meeting



"Today's new technologies are very demanding and move faster than the legacy ones."

Renaud Duverne, Agilent

the spec then it becomes harder to establish where the problem lies. Is it in the one box tester? Is it in one aspect of the test system?"

Mees is adamant that Tektronix won't compromise rf test requirements in order to meet demands for a 'one box fits all' solution. There is a market for having a modular box which can be upgraded as and when, but the problem really starts when you get into rf. And this, he says, is why you very rarely see modular RF equipment.

"Yes, having one box is a valid argument, but I've set up test benches and although it can sometimes be a challenge to connect all the cables and get the system to work and communicate effectively, the investment pays off in the long run," he maintained. "One disadvantage of a 'one box' setup for rf testing might be where you have an instrument with a noisy reference source which then affects all the tests. Our belief is to focus on

our individual test system products to ensure they perform, excel at what we're doing and make certain that the overall solution is primarily the one that the customer wants." 

