RTT TECHNOLOGY TOPIC
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3G handset hardware

Previous Hot topics have described the characteristics of 'rich media' and the properties of 'declarative content' - the ability of content to describe quality of service requirements - delivery bandwidth, memory bandwidth, processor bandwidth, display bandwidth.

This month's Hot Topic describes how 'declarative content' determines 3G handset functionality - in particular, the need for flexible, reconfigurable software and hardware platforms.

The general approach in the industry today is to transcode and/or re-render content to suit the device to which it is targeted.

This involves a process of 'device discovery' in which the network has to identify the target device in terms of its software **and** hardware form factor and functionality and then ensure that the content to be delivered can be demodulated, decoded and displayed.

An alternative approach is to deliver the content but change the device (or better, allow the device to re-configure itself).

The Two Options

1	Change Content	→	Deliver to Device
2	Deliver Content	→	Change Device

This already happens in the software domain - we are familiar with screen instructions telling us to 'download Adobe Acrobat' to read an incoming file.

Field Programmable Gate Arrays (FPGA's) are **beginning** to offer a (fiscally and functionally) realistic route to hardware re-configuration.

While it may not be feasible (yet) to change physical display characteristics, it is increasingly feasible to change other hardware parameters.

Reconfigurable routers are an example - routers that respond in real time to changes in traffic volume, mix and priority (aggregated QOS) to optimise routing performance.

Reconfigurable set top boxes (3G TV) are an example. FPGA based control logic in an MPEG decoder can be changed to process new media formats.

In a 3G wireless base station, FPGA's are/may be used (on the transmit side) to generate OVSF codes and (on the receive side) to implement matched filters and/or adapt to changing chip or clock rates.

These examples define two levels of reconfigurability to be delivered by FPGA's - static and dynamic.

Static configurability is the ability to change a product (product hardware) before **and** after delivery. The MPEG decoder is an example.

Dynamic configurability is the ability to change a product to meet dynamically changing application needs - the 3G wireless base station is an example.

Reconfigurability can therefore be defined by the question 'How often does my product need to change (or change itself)?' - every 100 days (a major hardware reconfiguration), every 100 minutes (a change to a hard wired encryption algorithm), every 100 seconds (a change in media format), every 10 milliseconds (an ATM/IMT2000 frame).

The answer determines software and hardware form factor and functionality.

In terms of hardware reconfiguration, FPGA's have their upsides and downsides. The upside can include time to market (you don't need to finish your product before it's shipped!). The downside may include cost (and sometimes) performance penalties.

Recent application studies tend to focus on the ability to **control and change** the hardware (FPGA) and software form factor and functionality of devices within or connected to a network. (e.g. routers within a network, handsets attached to a network) - remote **controlled** configuration.

The real benefits of reconfigurability will only be realised when we allow devices to reconfigure themselves (self-controlled configuration) in response to changes in application need.

Declarative content will help trigger this transition.

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