RTT TECHNOLOGY TOPIC
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The impact of the traffic mix shift on network hardware (1)

In earlier HOT TOPICS we have discussed the trade offs implicit in using software switching (flexible but slow) or hardware switching (fast but inflexible).

You can of course have flexible **and** fast but end up with over complex and expensive parallel processing engines heavily dependent on over complex and expensive memory (S-RAM and CAM).

Decisions on software/hardware partitioning self evidently have to be based on the requirements and characteristics of the traffic being processed.

In our March HOT TOPIC 'Turbulent Networks' we pointed out that as traffic becomes increasingly asynchronous it becomes progressively harder to control buffer delay and buffer delay variability. However it's not just 'burstiness' that needs to be considered when deciding on network processor performance.

In this month's HOT TOPIC, we want to consider some present traffic trends and their likely impact on network hardware design.

Longer Sessions

First, let's consider the impact of longer sessions. We have explained in previous **HOT TOPICS** that sessions are getting longer partly because file sizes are getting bigger but also because sessions are becoming more complex. Multi-media sessions tend to last longer than voice calls, multi-user sessions tend to last longer than one to one conversations, conversational exchanges last longer than best effort exchanges.

As session lengths increase it becomes more economic to switch in hardware or, put another way, you don't need lots of software instructions to switch a long session - it's a relatively simple and deterministic transaction.

Shorter Packets With a Fixed Rather than Variable Length

Packet size is reducing over time. This is because multi-media components are source coded using periodic sampling - typically 20 milliseconds for voice (the syllabic rate). Video sampling rates depend on the frame rate and source coding used but generally you will end up with a MAC layer which produces a stream of **fixed length** packets of typically 40 bytes . The decision to use fixed rather than variable length packets is driven by the need to get multiplexing efficiency even when the data rates coming from multiple sources can be widely different (video encoding is moving increasingly towards variable rate).

It is obviously absurd to take a 40 byte payload and add a 40 byte IPv6 header to each packet so the idea of treating each packet as an individual entity in a multi-

media network is no longer valid.

As we move towards short, fixed length packets it makes sense to hardware switch.

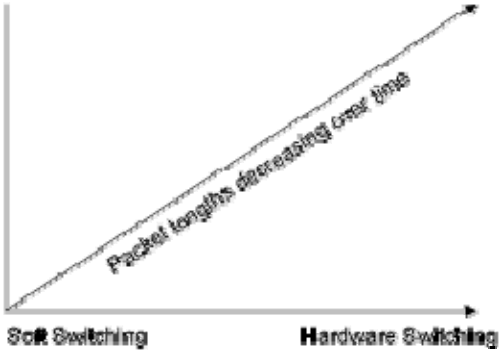

Figure 1 - Hardware Switching Increases as Packet Length Reduces

Fixed Routing

As session length increases, we move progressively towards providing **less** rather than more routing flexibility.

Traditionally in an IP network, routing flexibility has been promoted due to it's ability to improve transmission bandwidth utilisation and increase network resilience. However the cost is delay (first order effect) and delay variability (second order effect). As traffic becomes more inelastic over time we become less tolerant to any change in routing trajectory. In our January HOT TOPIC we defined a real time network as 'A network that provides throughput to asynchronous (and occasionally extremely asymmetric) traffic in a predictable amount of time'. This is difficult to do if we allow routing flexibility.

About RTT Technology Topics

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We aim to introduce new terminology and new ideas to clarify present and future technology and business issues.

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RTT, the Shosteck Group and The Mobile World are presently working on a number of research and forecasting projects in the cellular, two way radio, satellite and broadcasting industry.
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