In previous Hot Topics we have identified consistency as a key performance indice (KPI) in a 3G wireless network. In this month's Hot Topic we set out to develop some consistent ways of measuring and managing consistency.

Why is Consistency Important?

The importance of consistency has already been clearly established in previous generations of cellular network deployment. Consistency in a 2G network was/is a product of voice quality and dropped call performance. Consistent voice quality and the ability to complete a call without interruption were and still are the best way to maintain an acceptable level of user/customer satisfaction. Note that even if voice quality is relatively poor, if it is consistent, we perceive the quality to be better than it actually is. Conversely, even if voice quality is good, if it is inconsistent, we perceive the overall quality to be poor.

3G Consistency Metrics

In our June Hot Topic, we said that session consistency and session persistency provided the basis for building session value together with session immediacy and session complexity.

As session complexity increases, it becomes harder to maintain session consistency. As session persistency increases, (ie as a session gets longer), it becomes harder to deliver consistency. As session immediacy increases, it becomes harder to deliver consistency.

We have maintained, and still maintain, that delay and delay variability degrade session value. The highest value component in our offered traffic mix is a conversational complex content (rich media) exchange. The complex content exchange consists of time sensitive time interdependent simultaneous audio, image, video and data streaming. Conversational complex content cannot be buffered as buffering introduces delay and delay variability. Conversational complex content can therefore only be delivered over a circuit switched or closely managed ATM cell switched transport layer or an IP session with equivalent control of end to end delay and effectively no end to end delay variability. Consistency, when considered in the context of a time sensitive complex content exchange is also critically dependent on the close control of admission and access policy.

In our July Hot Topic, we showed how the RNC (Radio Network Controller) has to manage complex content and complex admission control on the basis of interference measurements from the radio physical layer and congestion measurements from the

core network.

Inconsistent interpretation of this feed back information will deliver inconsistent network performance which will translate into an inconsistent user experience.

Attempts to improve bandwidth utilisation/bandwidth efficiency (ie to decrease delivery cost) generally have a performance cost in terms of loss of consistency.

We can improve bandwidth utilisation in an IP network by queuing. Queuing implies user access prioritisation. It becomes difficult to maintain a consistent interpretation of access and policy rights, particularly when individual user requirements are constantly changing.

We can only deliver consistency if we have a high degree of control over network performance.

It is difficult to have a high degree of control over IP network performance, particularly when we add the inherent inconsistency introduced by the radio physical layer (dropped calls and varying transmission quality due to the fading channel).

Consistency implies a transparent view of network bandwidth which can only be securely delivered by using out of band signalling (ie the use of SS7 in a signalling plane physically separated from the traffic flow), ie the 'cost' of consistency is significant signalling overhead.

We can compensate for a loss of consistency by rebating customers/users to whom we fail to deliver a pre-agreed level of service. Compensation, particularly the administration of rebates however, incurs hidden costs including the need to define the cost of managing customer complaints.

As always, it remains good practice to provide consistent levels of service that are better than customers anticipate or expect. If we provide inconsistent service, we need to ensure the level/degree of inconsistency is either unnoticeable or below the level of customer indifference (the point at which the customer cares).

Consistency is arguably the most under-rated metric in present IP network performance planning. The addition of the radio physical layer adds to the problem. Consistency will also become increasingly important as content becomes more complex over time.

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