

Controlling Internet Quality with Price

Market Managed Multi-service Internet

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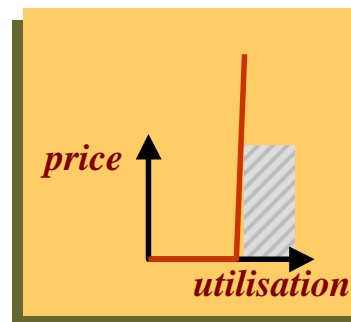


M3I

- *self-managing Internet resources*
 - through market forces
- *show validity of approach through:*
 - economic and network modelling
 - software and network engineering design & prototyping
 - customer experiments



pricing principles



- *edge pricing & bilateral contracts - strict*
- *(be able to) price approaching congestion*
- *(be able to) price at service granularity - no flows, no SLAs*
- *(be able to) introduce new tariffs & mechs - policy ctrl*
- *(be able to) be commercially open - bundling, re-sale*

- *minimise then synthesise*
 - design end to end
 - then synthesise services at edge - *technical & commercial*

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end to end QoS means...

✓ *QoS synthesised by the ends*

- ✓ scalability and evolvability



✗ *not just QoS everywhere along the path*



- ✗ integrated services arch (Intserv),
- ✗ differentiated services SLAs (Diffserv)
- ✓ ECN + diffserv field...

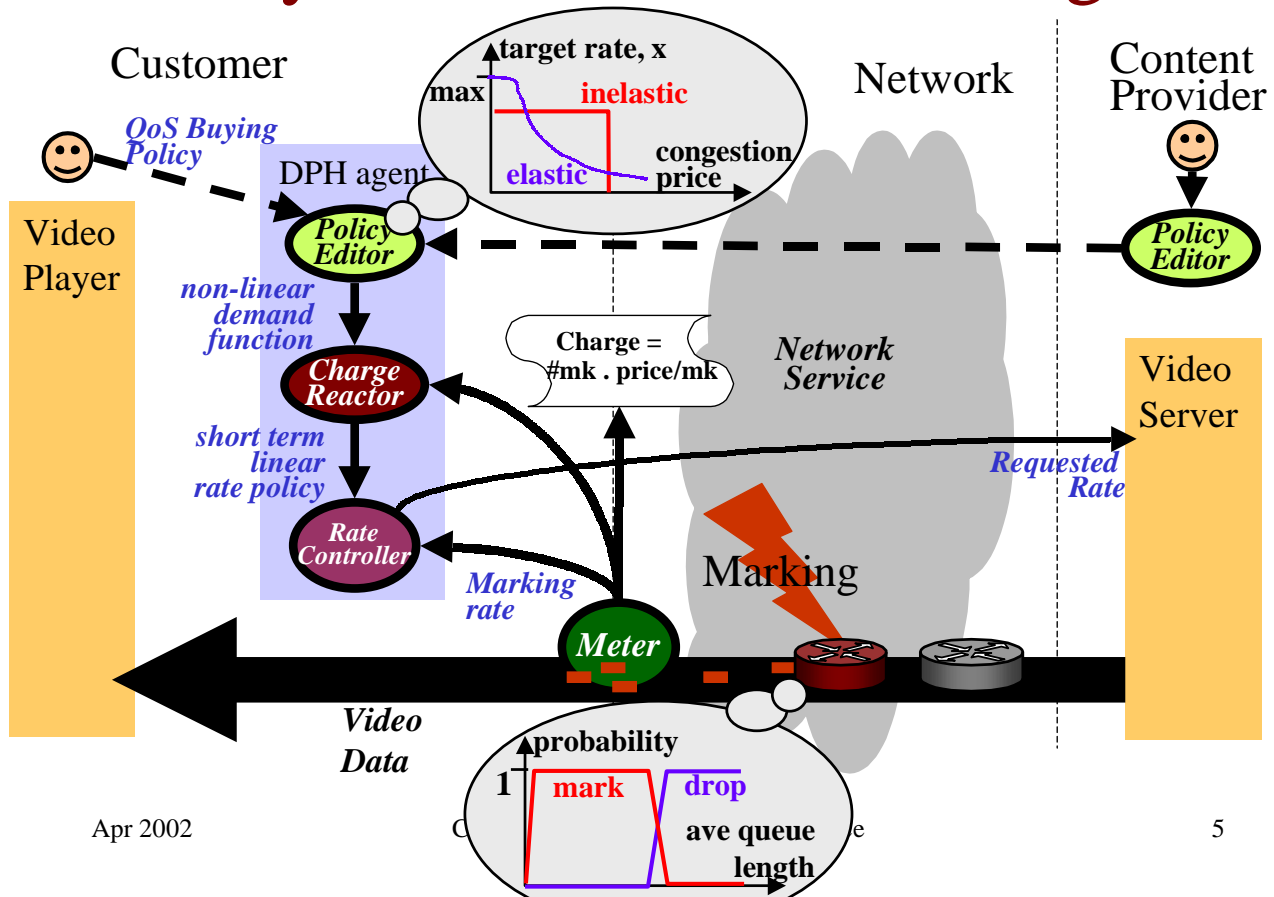
• *computing industry vs. networking industry*

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Dynamic Price Handler agent



e2e = tussle of industries

- *network operators & vendors think:*

- QoS = added value
- e2e = beyond the horizon (scalability & evolvability)

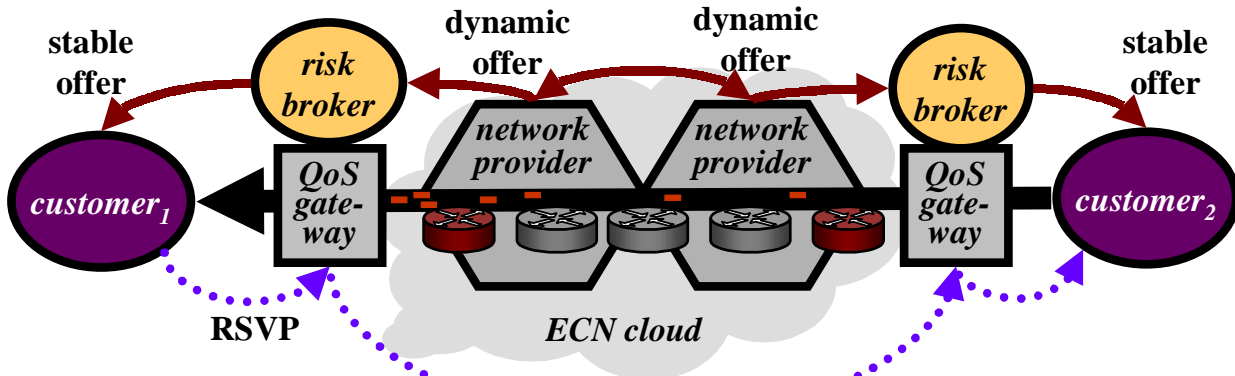
- *solve dilemma:*

- design for e2e QoS
- then pull back control into edge
 - under *policy* control
 - tariff = policy [M3I architecture]
- when network-centric QoS commoditises (5-7yrs)...
 - ...expose raw e2e QoS interfaces
 - as *option* e.g. for computer-computer traffic



synthesised admission control

dynamic congestion pricing → *session admission control*
packet QoS → *session QoS*



- ***guaranteed QoS***
 - indistinguishable from Intserv
 - no per flow processing, no SLAs within ECN cloud

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no time for...

- ***e2e QoS stability***
 - second order dynamics of e2e QoS
 - user experiments on utility of stability
- ***ECN with wireless access (no buffers)***
- ***enabling business model innovation***
 - active tariff objects for policy control
 - of QoS control architecture
 - of charging system, rate controllers, etc.
 - wholesale market structure
 - inter-domain pricing, price-based routing
 - avoiding global business models (carrier selection)
 - retail market structure
 - multi-homing, provider selection by quality-value
 - avoiding global business models (roaming, termination charges)
 - SLAs irrelevant for retail market

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more info

- *M3I project*
 - Jan 2000 - Mar 2002
 - first papers and deliverables
 - <http://www.m3i.org/>
- *Bob Briscoe:*
 - <http://www.btexact.com/people/briscorj/>