

Broadband Benchmarks

SLT Broadband Services and the Quality of Services

Presented by

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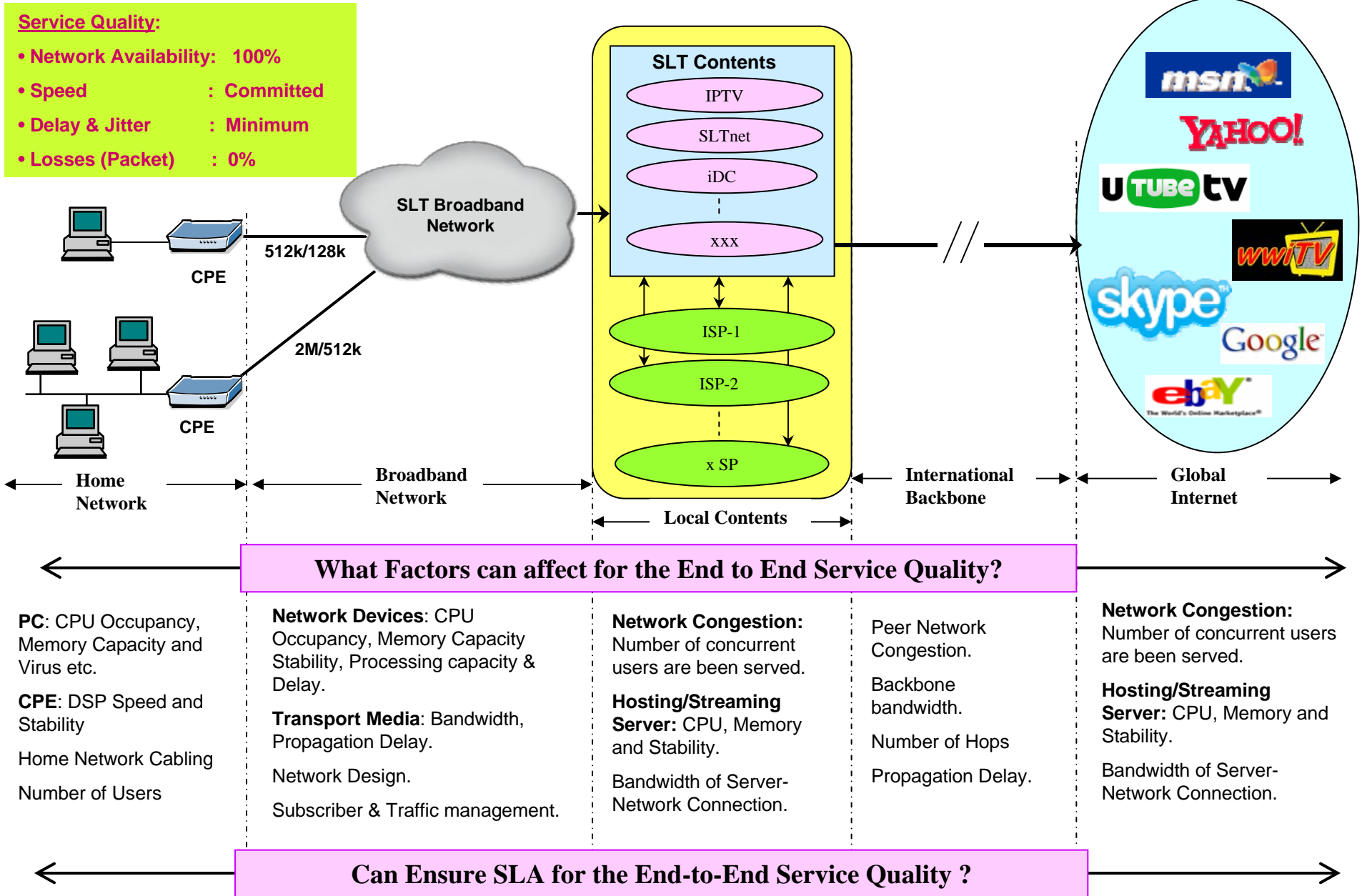
IP & Broadband Division

Sri Lanka Telecom

18th March 2008

IESL

End-to-End SLT Broadband Services Access Model for the Consumer Services.



Our Challenges

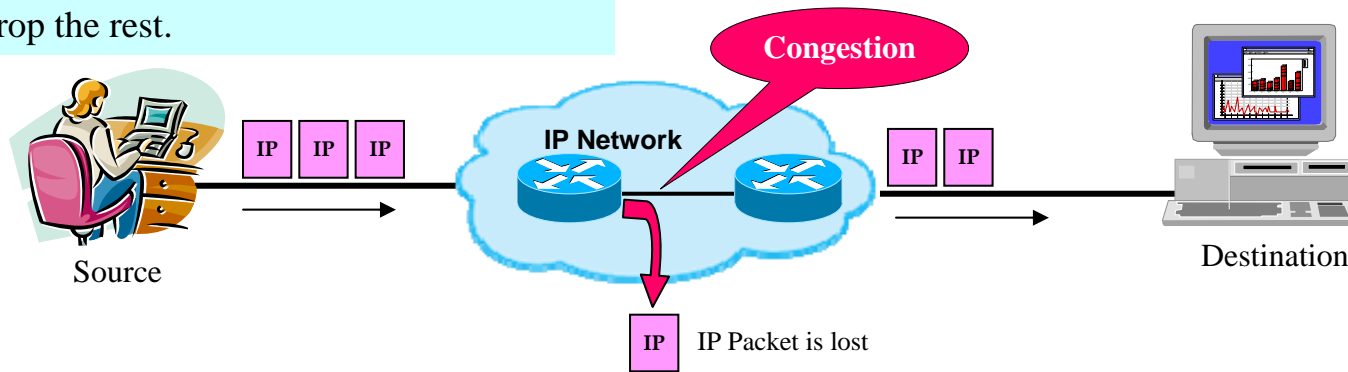
- **Poor Local Contents.**
- **Majority access international contents.**
- **More Download than Upload.**
- **Less Mirror sites for the popular sites.**
- **Major portion of the tariff is for the international bandwidth.**
- **Expensive International Backbone Bandwidth.**
- **Tariff and Affordability.**

Internet is Best Effort IP Network

Why Best Effort?

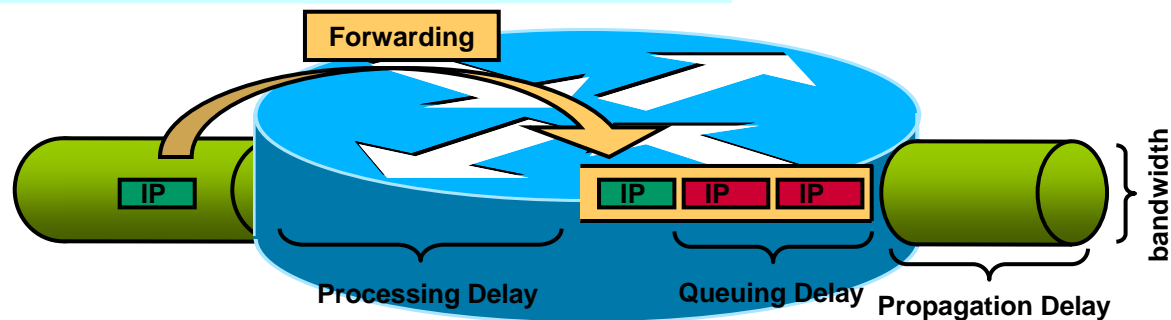
- Let every body send.
- Try to deliver, what the network can ... and
- just drop the rest.

Congestion is unavoidable in IP networks. Many IP packets are arrived at the same time, the node can only forward the possible and the rest of the packets are either buffer or drop. The buffer may also eventually overflow.



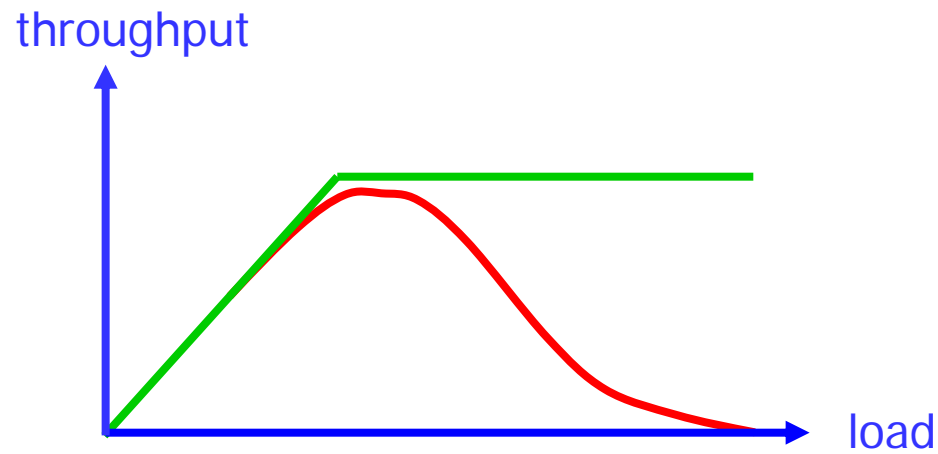
IP packets can be delayed due to

- processing delay of the Router
- Queuing delay at the input / output buffers of the router.
- Propagation Delay.



Effect of Congestion

- What is Congestion?
Load is higher than the capacity
- What the routers do?
Drop the packets which are not possible to either forward or buffered
- Why congestion is bad?
Waste Bandwidth for re-transmission and can occur congestion collapse.



SLT Broadband Packages

Use ADSL2plus with Annex-A, Annex-L Annex-M Technologies

For Consumers

Home Express (512 kbps / 128 kbps): Unlimited Usage Rs.2,250.00 per month

For single or few users, those who do not interest to manage the volume of their usage.

Office Express (2 Mbps / 512 kbps) : Unlimited Usage Rs.6,750.00 per month

For multiple users, those who do not interest to manage the volume of their usage.

Entrée (512 kbps / 128 kbps): Limited Usage (Volume-Based) 1GB per Month for Rs.1,000.00,
Rs.250.00 per additional 256 MB

For single or few users, those who need fast speed at all time and they interest to manage the volume of their usage.

No significant difference of the end to end performances in accessing global internet at the peak hours by the two SLT broadband packages "Home Express" and "Office Express".

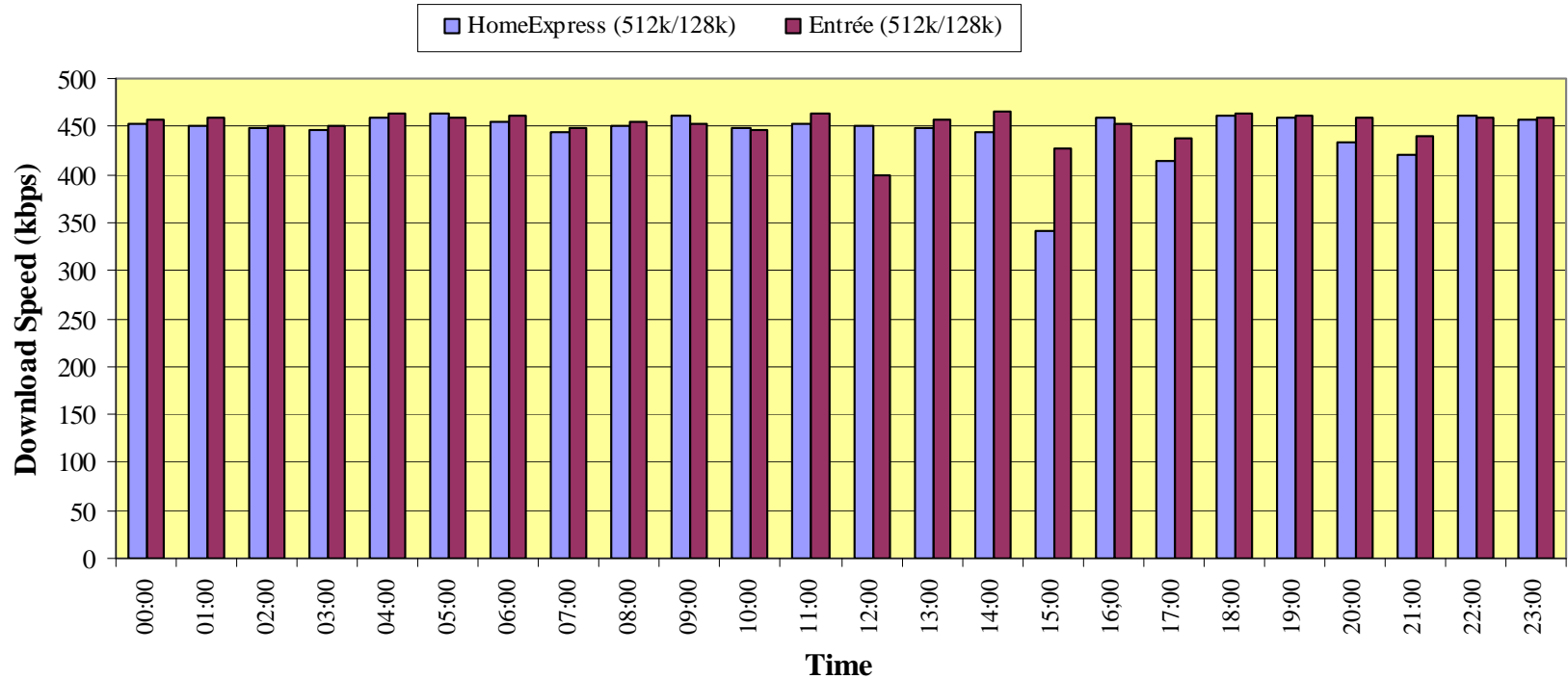
For Corporate Customers

Symmetric 64 kbps, 128 kbps, 256 kbps, 512 kbps, 1 Mbps,2 Mbps DSL for VPN access with SLA.

SLT Broadband Quality of Service Indicators

For the Home Express & Entrée (512 kbps /128 kbps)

Download Speed for local Site (ISP: www.slt.net.lk)



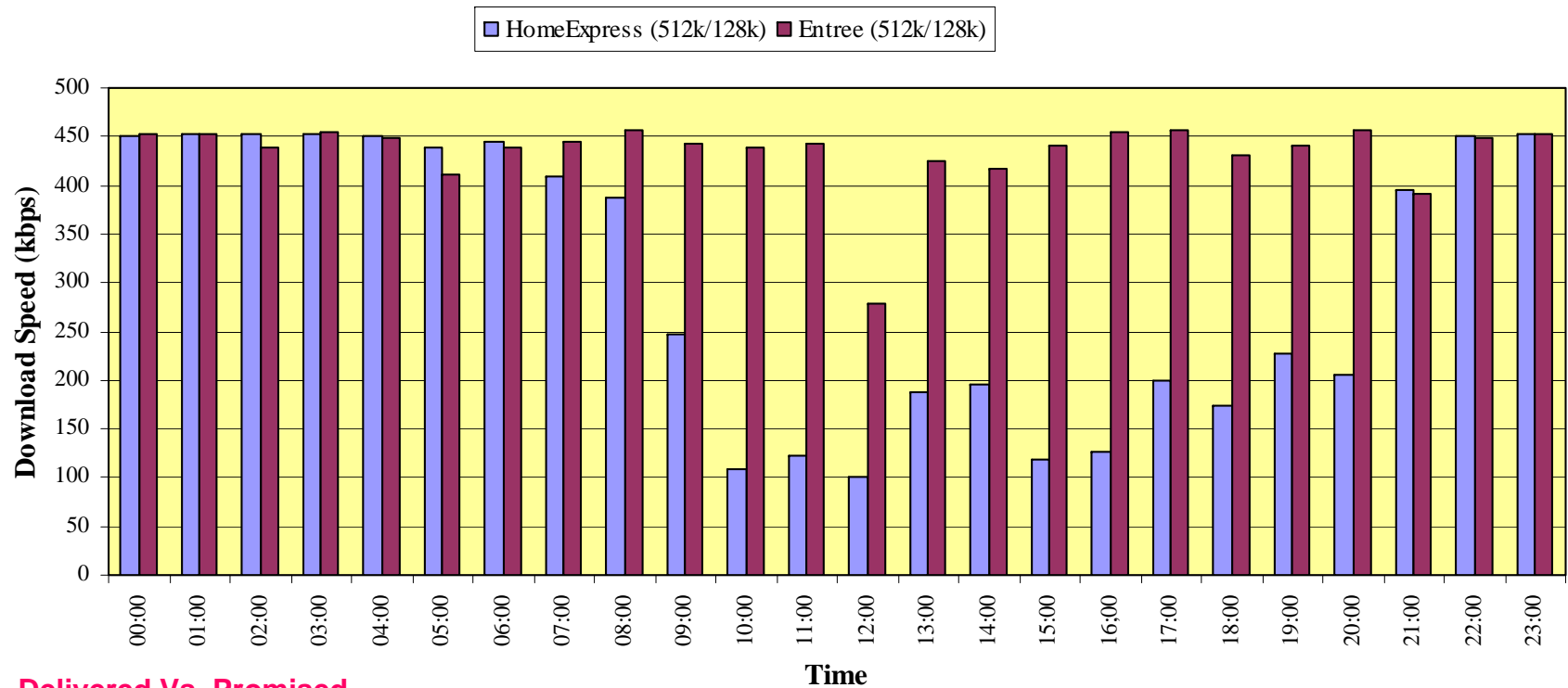
Delivered Vs. Promised

	Minimum	Maximum	Average
Home Express (512k/128k)	341.7 kbps (67%)	464.5 kbps (91%)	445.2 kbps (87%)
Entree (512k/128k)	398.7 kbps (78%)	464.8 kbps (91%)	452.2 kbps (88%)

SLT Broadband Quality of Service Indicators

For the Home Express & Entrée (512 kbps /128 kbps)

Download Speeds for International Site (www.yahoo.com)



Delivered Vs. Promised

	Minimum	Maximum	Average
Home Express (512k/128k)	101.3 kbps (20%)	452.7 kbps (88%)	302.3 kbps (59%)
Entree (512k/128k)	278.9 kbps (54%)	457.3 kbps (89%)	433.7 kbps (85%)

SLT Broadband Quality of Service Indicators

Network Availability: 99.75%

Average Figures at Peak Hours (Measured during 11.00 – 14.00)		ISP Gateway	Local Sites		International Sites	
			sltnet.lk	trc.gov.lk	Yahoo.com	Download.com
Delay (ms)	Home Express	6	9	15	411	300
	Entrée	6	9	15	248	285
Jitter (ms)	Home Express	0.48	0.57	5.4	3.5	0.5
	Entrée	0.45	0.56	5.5	0.56	0.65
Packet Losses (%)	Home Express	0	0	4	3	5
	Entrée	0	0	4	0	0