Network Management Practises

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Operations, Capacity Control

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- Employed in Operations, Capacity, Capacity Control, Projects
- The Group is responsible for all build out of the equipment for fixed access, the metro networks, the IP/MPLS Core Backbone and the International IP/MPLS Backbone
- Personally I am responsible for Peering and Transit for TDC
- Other responsibilities are Traffic Management in the core and the International Network, Core design, Mobile core IP connectivity projects and IP addresses.
- Worked at TDC for 12 years and within these areas 8 years.

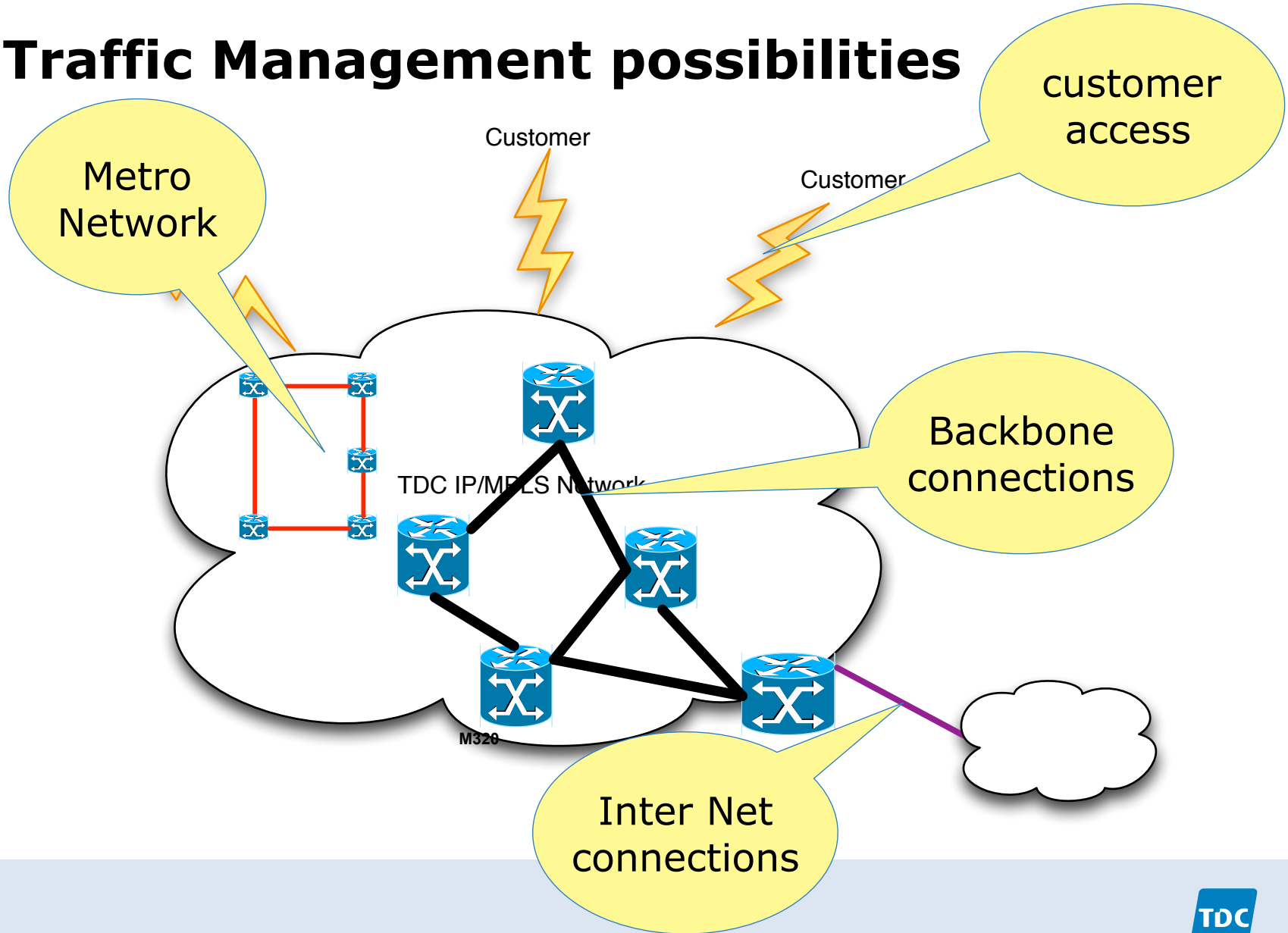
Network Management

- In this context - the Network Neutrality Forum - we mean Traffic Management
- Traffic Management - managing traffic by differentiating packets' probability of reaching their destination
- Traffic Management can take place on various points in the network. Typically the methods will vary accordingly

TDC traffic Management for Internet Service

- There is no traffic Management for Internet Access in any of TDC's services.
- TDC's Internet Service shares physical and logical Infrastructure with a number of other TDC services.
- In order to secure the right quality for different types of services, traffic is prioritised between (and within) these services in the network and on the customer access if the customer is also using their access for a number of different services.

Traffic Management possibilities



Customer Access

- Reserved bandwidth for voice
- TV prioritised over Internet on the same bandwidth
- If there is no TV service in use, Internet can use the full bandwidth on the line between cpe and DSLAM. Internet can use the remaining bandwidth if TV is being used.

Backbone and Metro Net

- Traditional Implementation of NC-EF-AF-BE traffic classes.
- All Internet traffic is BE
- There is no knowledge in any network devices about what type of services is being served over Internet. Hence there are no management of traffic based on over the top services.
- MPLS VPN customers have the option of getting their traffic mapped into the traffic classes.
- The traffic classes are also used for TV distribution and for Voice Services. These are not Internet Services.

Inter Net Connections

- Internet Peering and Transit connections have no traffic classes. All traffic is mapped in the BE class in the backbone
- Inter MPLS Net connections which extends customers MPLS VPN networks into other operators networks may offer mapping the traffic into corresponding traffic in the remote network so traffic is prioritised in the same as internally in TDCs network
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Challenges

- Over the top Video services
  - Google Youtube
  - HD streaming from Sports Events like the Olympics
  - In the near future Netflix
  - TDC movies
- All these are Internet Services that uses a significant amount of bandwidth both on the customer access, on the Metro Networks and in the Backbones

Or is it?

- We do not see an increase in the growth of the total traffic volume in TDC's network, hence we do not have an **increased** need to build out in spite of the amount of Internet traffic.
- The over the top service have chosen the open Internet as their distribution method, hence their players and way of serving the content takes the nature of the Best Effort Internet into account.
- The customer can always choose to use their full available bandwidth on over the top services.