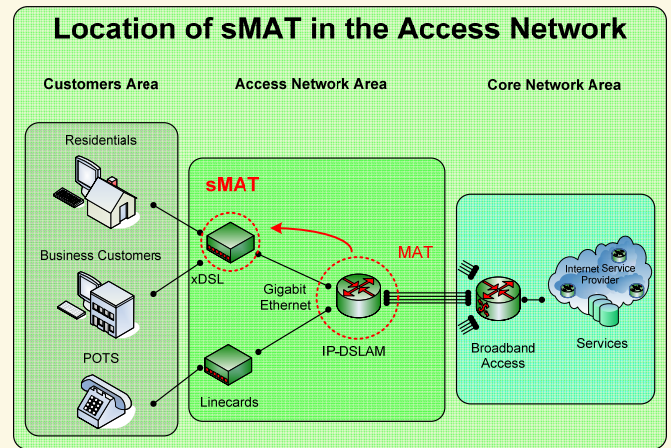


– sMAT –

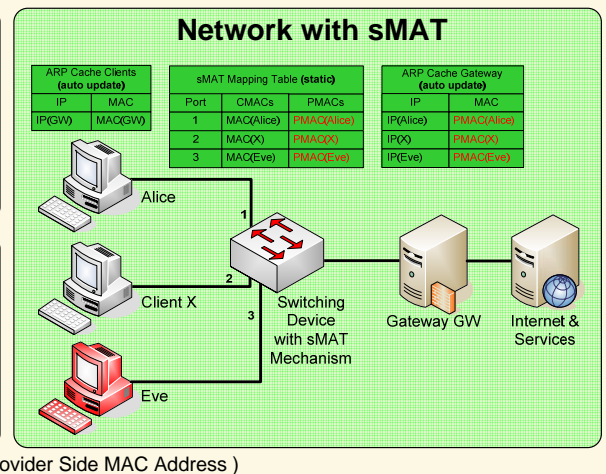
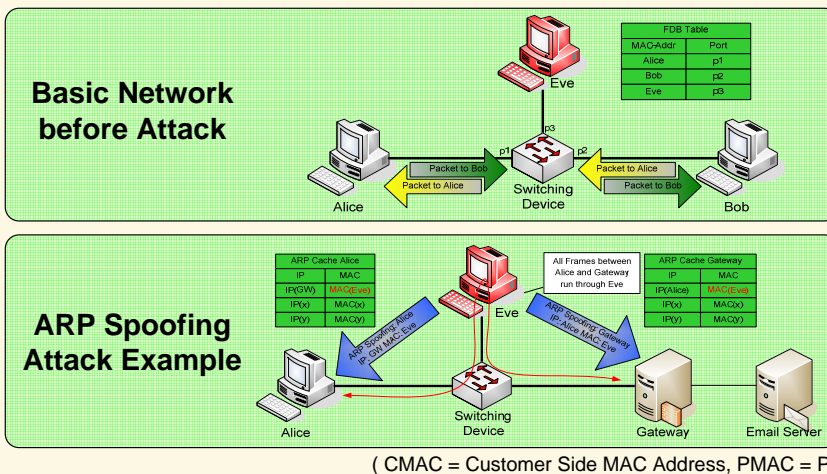
A simplified MAC Address Translation Scheme

Problem Description & Motivation

- Scalability and security problems in future Access Networks
 - Growing bandwidth and user numbers
 - High volume multimedia services
- Switching on layer 2 without traffic separation is prone to attacks!
- Existing solutions (i.e., VLANs, MiM, MAS) are not scalable or standard-compliant (IEEE 802.3)!
- Software solutions may still suffice but will not in the future!
- Bandwidth aggregates towards core network (e.g., GDSL [Cioffi'06])
- Decentralization of functionality towards customer edge
- Packet processing in hardware to guarantee non-blocking operation
- sMAT is "simplified" compared to MAT:
 - "An integrated Hardware Solution for MAT, MPLS-UNI, and TM in Access Networks" 31st Annual IEEE Conference on Local Computer Networks, 2006, Tampa, FL, USA
 - "Wire-speed MAC Address Translation and Traffic Management in Access Networks" World Telecommunications Congress 2006, Budapest, Hungary



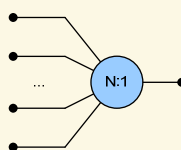
sMAT Mechanism – Example



Capabilities and Advantages

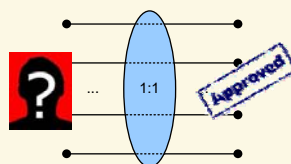
Scalability:

- Reducing the number of MACs by n:1 mapping
- No FDB overflow in subsequent network segments
- No overflow within sMAT module due to limited number of CMACs per port
- PMACs can be hierarchically structured, e.g., linecard-ID & DSLAM-ID & incremental part



Security:

- MAC address spoofing prevention: source MACs will already be translated at network ingress
- MAC address flooding prevention: limiting the number of valid CMACs per port
- Prevention of failopen mode through MAC table explosions
- Active ARP spoofing prevention: ARP information is translated
- Prevention of higher layer attacks, e.g., DNS spoofing
- No duplicate MACs after translation
- sMAT itself is fully transparent and not addressable or vulnerable



Standard-compliant to IEEE 802.3:

- Similar encapsulation schemes exist
 - MAC Address Stacking (MAS)
 - MAC-in-MAC (MiM)
- But both modify a frame's size and structure
- sMAT does **not** modify size or structure
- No functional extensions required in existing switching hardware

Miscellaneous:

- Seamless integration due to transparency
- Unattended & maintenance-free
- Configuration at synthesis time
- Feasible for hardware implementation on DSL linecards
 - e.g., in ASICs or existing FPGAs (low Costs)
- Operation at wire-speed with very low latency



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