



# MULTICAST BASED RAMS

draft-johansson-avt-mcast-based-rams-03

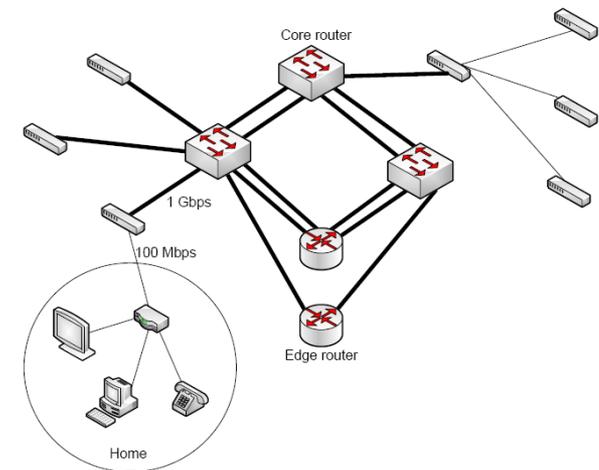
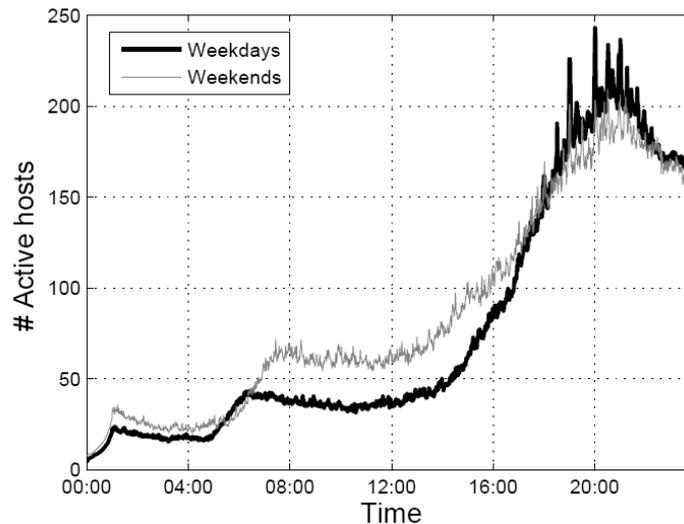
# Outline

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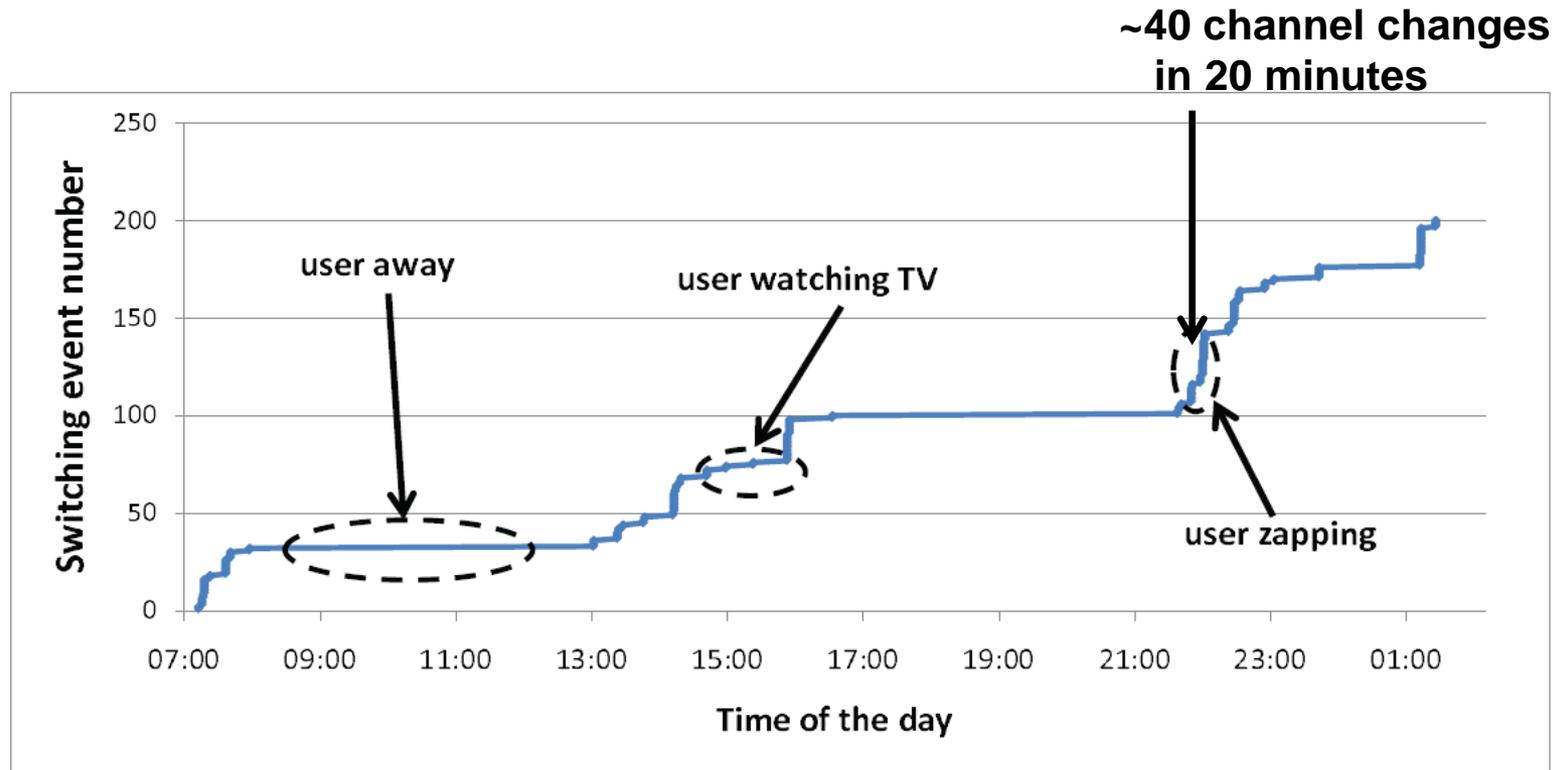
- › Insights into end user behavior
- › How it affects fast channel change
- › Proposed extension to RAMS

# IPTV Measurements

- › 3 weeks of traces from a Swedish municipal network
  - 1 minute resolution
- › FTTH, 100Mbps symmetric
- › 350 STBs
- › 2Gbps backbone
- › IGMP

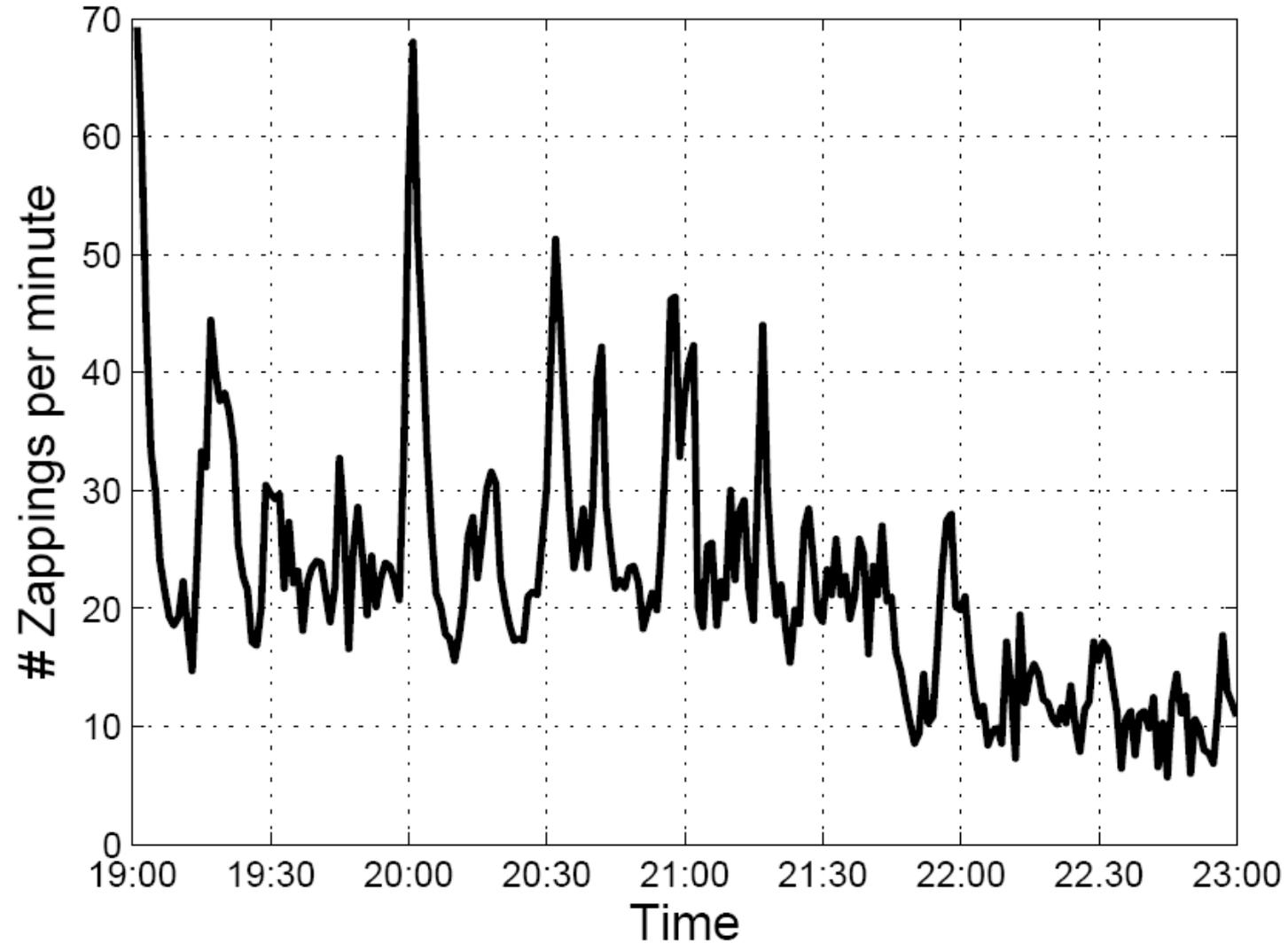


# User behavior



IPTV switching events, one typical user, one typical day

# User behavior



# User behavior

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- › User activity highest from 7PM – 11PM
- › Users tend to switch channel many times in short periods of time
  - Seeking for interesting content
- › Many users tend to change channel at the same time
- › Channel change peaks occur at the beginning of every 30 minutes
  - Ad breaks
  - End of programs
- › ? Tendency to zap proportional to perceived channel change latency ?
  - Measurements done on non-RAMS enabled system. A RAMS enabled system may increase zapping tendency?.

# Proposed extension

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- › ERAMS = Extension to RAMS framework
  - Most of the procedures in ERAMS already covered by RAMS
  - ERAMS adds the following to the RAMS protocol
    - › 3xx redirect response code
    - › Two new TLV field types to RAMS-R and RAMS-I

# Proposed extension

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- › FCC server uses RAMS unicast when request rate is low
  - Function according to RAMS specification
- › FCC switches to ERAMS when request rate is high
  - The FCC server gathers a number of RAMS-R for the same channel
  - Each RAMS-R is responded with a RAMS-I that indicates the ERAMS multicast channel
  - After a waiting period ( $T_d$ ) the ERAMS multicast is started
  - Peak load on FCC server is scaled down in direct proportion to the number of users that share the same ERAMS multicast channel(s)
    - › Unicast traffic between the FCC server and the STB across the access network is also reduced.



# Concluding remarks

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- › Use Unicast based RAMS at low load
- › Use Multicast based RAMS (for popular channels) at high load
- › Provides graceful degradation
- › Bandwidth is spared during “peak hours”
- › Author requests draft-johanson-avt-mcast-based-rams to become an AVT WG item
  - Questions/Comments welcome on the AVT list or <mailto:ingemar.s.johansson@ericsson.com>