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# SIMULATION RESULTS FOR MULTI-STREAM

[draft-ietf-avtcore-rtp-multi-stream-01](#)

[draft-ietf-avtcore-rtp-multi-stream-optimisation-00](#)

# Overview



- › Current Status
- › Simulation Purposes
- › SSRC Report Aggregation Issue
- › Report Group Extension performance gains
  - RTCWEB use case
  - Selective Forwarding Middlebox use case
- › Next Steps

# Current Status



- › Neither drafts was updated before this meeting
- › [draft-ietf-avtcore-rtp-multi-stream-01](#) Issues:
  - How does the RTCP Scheduler work when aggregating
  - How does one calculate avg\_rtcp\_size when aggregating
  - Need for unicast session joiners use of no initial delay
- › [draft-ietf-avtcore-rtp-multi-stream-optimisation-00](#)
  - Missing Signaling Specification
  - Security Considerations needs extended
- › Both Drafts will benefit from further editing
- › However, focus on first resolving open issues

# Simulation Purpose



- › Determine size of issue with SSRC aggregation
- › Enable trying out proposals to fix issues
- › Verifying that what we write works as intended

# SSRC Aggregation



- › Simulating what happens when an end-point performs SSRC RTCP Report aggregation
- › Implementation does the following:
  - Schedule all SSRCs
  - When a SSRC is scheduled for transmission
  - Fill compound packet with the triggered SSRC's:
    - RTCP SR/RR
    - SDES CNAME
  - › Plus as many of the nearest scheduled SSRCs reports that fit in MTU
  - Send Packet
  - Reschedule all of the sent SSRCs

# SSRC Aggregation



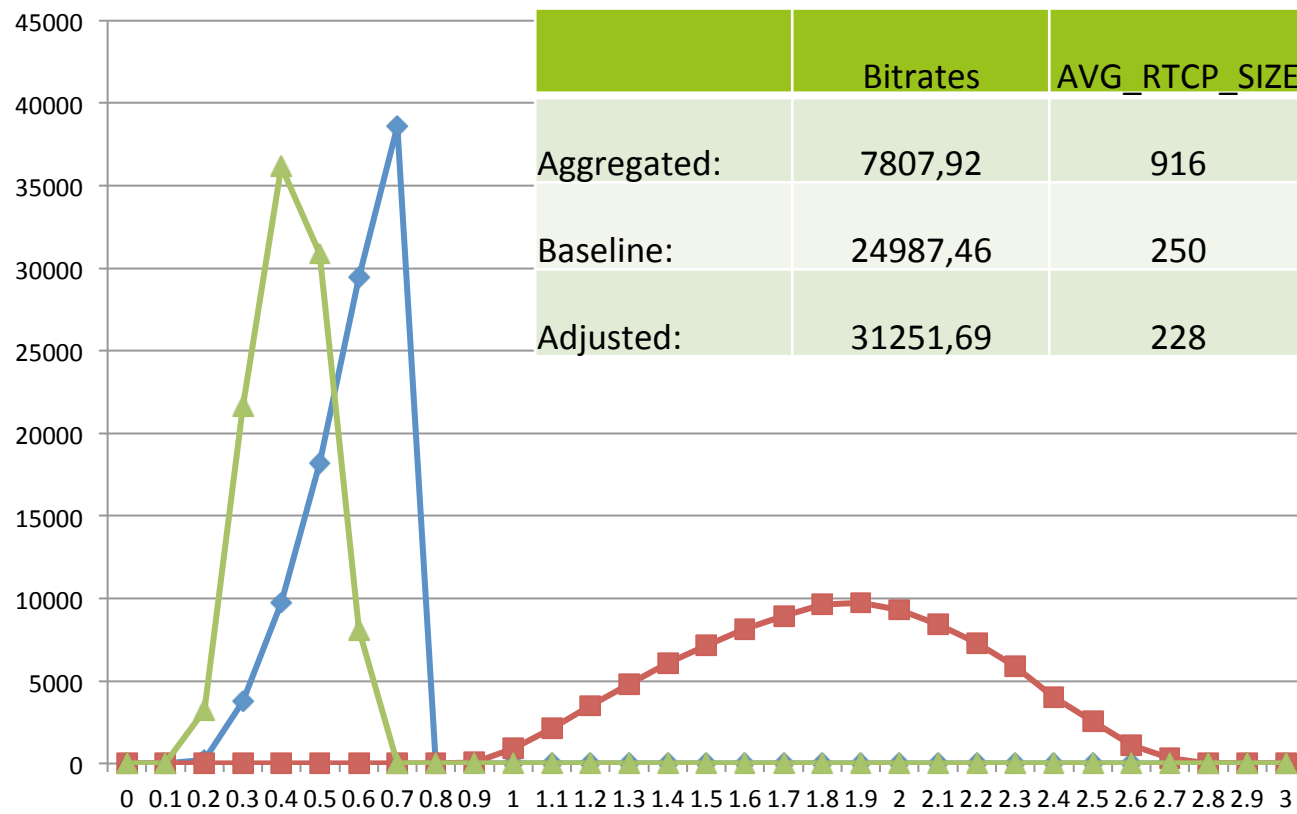
- › Simulation case RTC:
  - Two endpoints
  - Each endpoint has 4 SSRC, all four active senders
    - › Members = 8
    - › Senders = 8
  - RTCP bandwidth
    - › RS: 10 kbps
    - › RR: 15 kbps
  - Regular AVPF
    - › T\_RR\_INT = 0
    - › Include Full Cross Reporting
      - Each SSRC reports on the other 7

# SSRC AGGREGATION

## RTCP Transmission Interval Distribution



Frequency (RTCP Packets / bin)



- ◆ Baseline
- Aggregated
- ▲ Adjusted

Transmission interval (s)

# Conclusions



- › The documented issue for SSRC aggregation in [draft-ietf-avtcore-rtp-multi-stream-01](#):
- › The issue really exists:
  - RTCP transmission interval significantly increased
  - Implementation of scheduling changes the interval distribution
- › Using the basic idea and scaling `AVG_RTCP_SIZE` with number of reporting SSRCs per packet
  - Overshoots the RTCP bandwidth significantly (25%)
  - Appears to be due to scheduling implementation
    - › Picks the best out of the SSRCs (4) being aggregated
- › Need to figure out better compensation / scheduling



# Report Grouping



- › Implements the report group extensions from
  - [draft-ietf-avtcore-rtp-multi-stream-optimisation-00](#)
- › Active Reporter:
  - Reports on remote SSRCs, not any within the same report group
  - Includes an extra Source Description item with report group
  - Will be multiple ones if SSRC to report are more than 31
- › Non Reporter
  - Only sends regular SR or RR without any report blocks
  - Extra Reporter Sources RTCP Packet (4+4\*Reporters bytes)
  - These simulations are done without SSRC aggregation
- › Simulated Two different Use Cases

# Report Grouping: RTC CASE



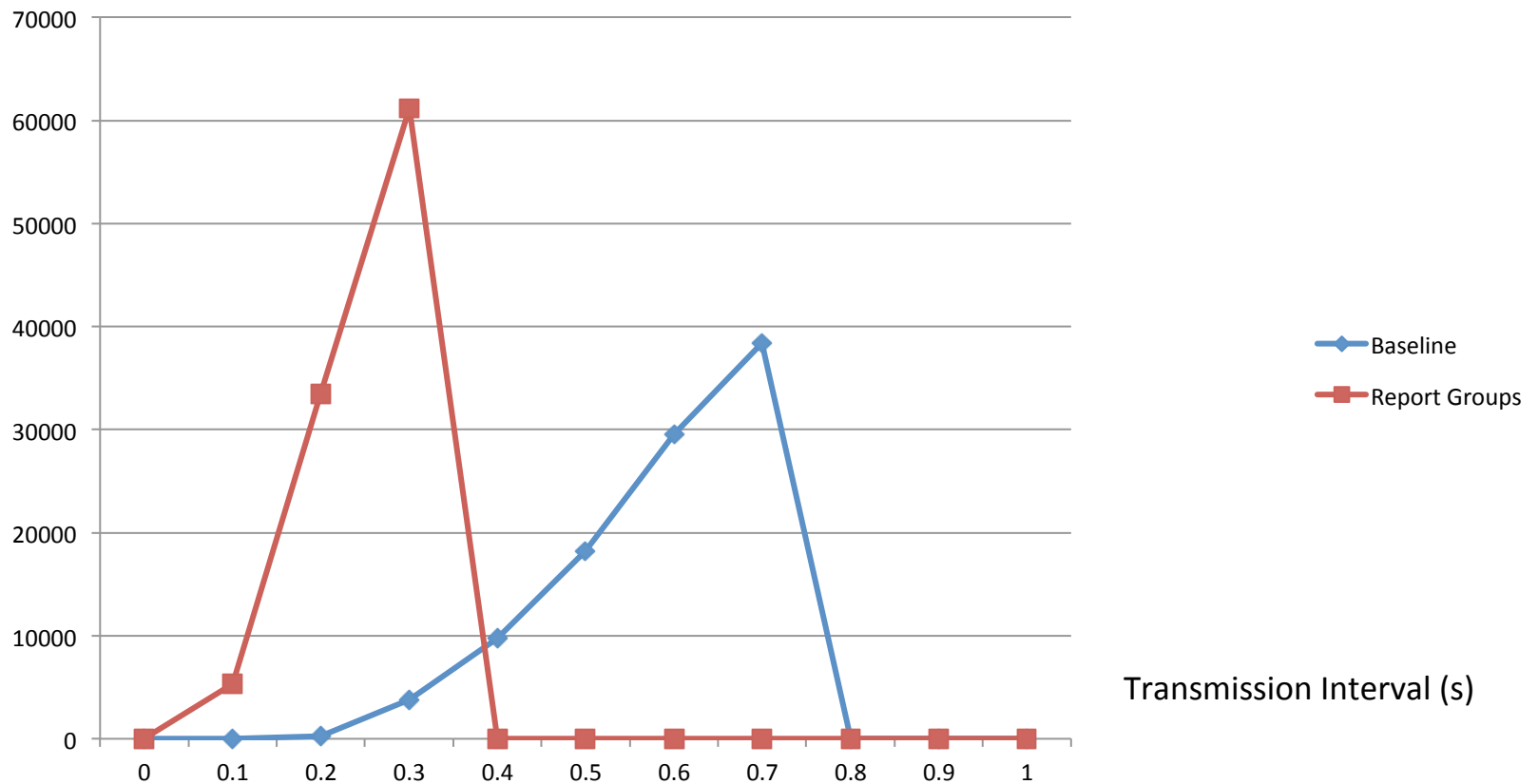
- › Simulation case RTC:
  - Two endpoints
  - Each endpoint has 4 SSRC, all four active senders
    - › Members = 8
    - › Senders = 8
  - RTCP bandwidth
    - › RS: 10 kbps
    - › RR: 15 kbps
  - Regular Reporting in AVPF
    - › T\_RR\_INT = 0
  - Baseline:
    - › Include Full Cross Reporting

# RTC Use case Results

## RTCP Transmission Interval

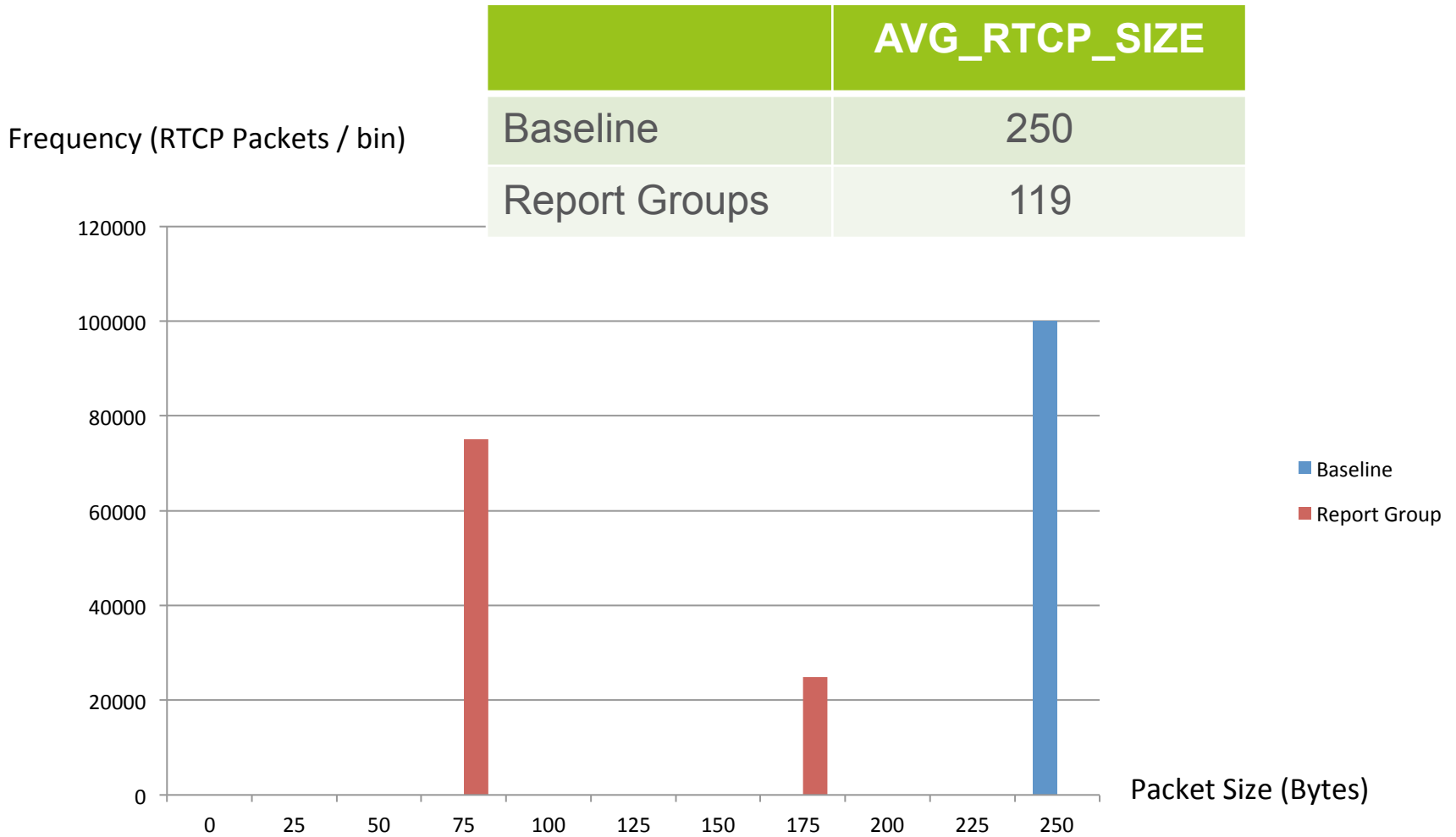


Frequency (RTCP Packets / bin)



# RTC Use case Results

## Packet Size Distribution



# Selective Forwarding MiddleBOX Use CASE



## › Simulation case SFM:

– Two endpoints

– Endpoint 1:

› Total SSRCs: 80

› Sending SSRCs: 20

– Endpoint 2:

› Total SSRCs: 120

› Sending SSRCs: 42

– Members = 200

– Senders = 62

– RTCP bandwidth

› RS: 75 kbps

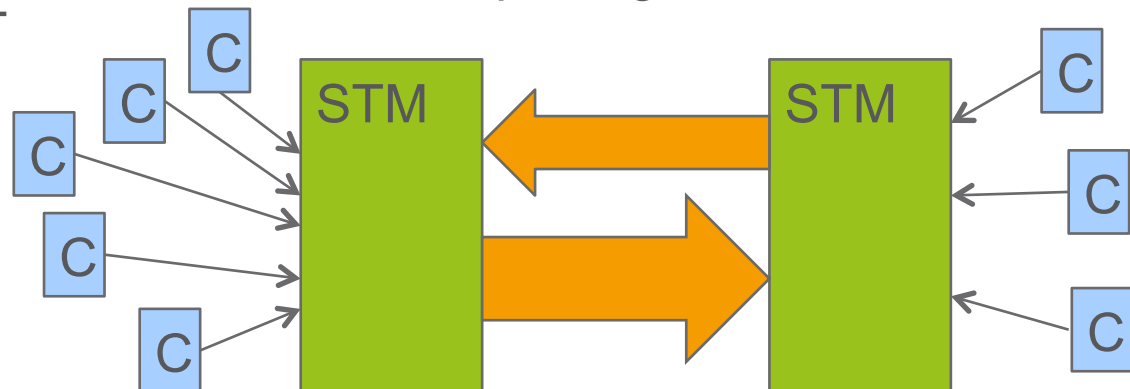
› RR: 50 kbps

– Regular Reporting in AVPF

› T\_RR\_INT = 0

– Baseline:

› Include Full Cross Reporting

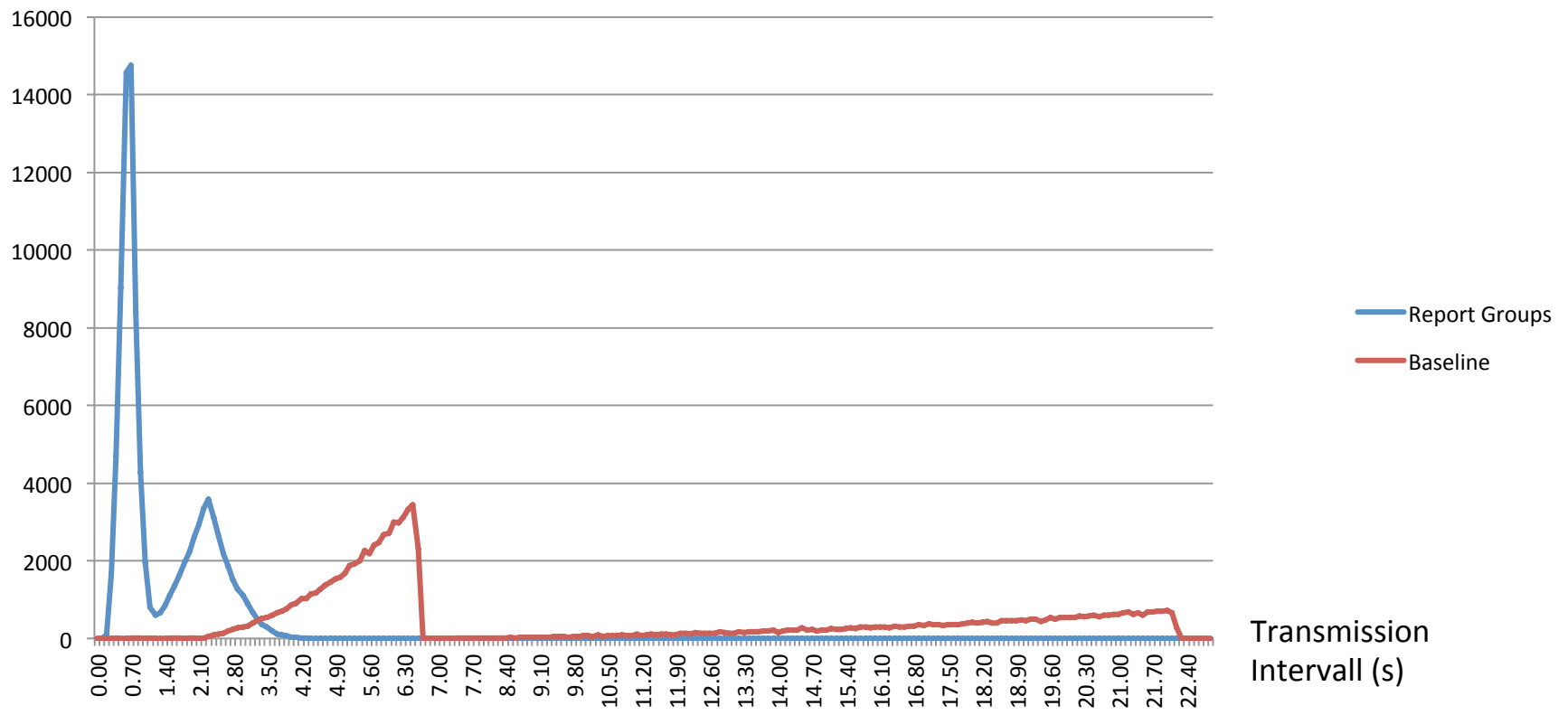


# SFM Use case Results

## RTCP Transmission Interval

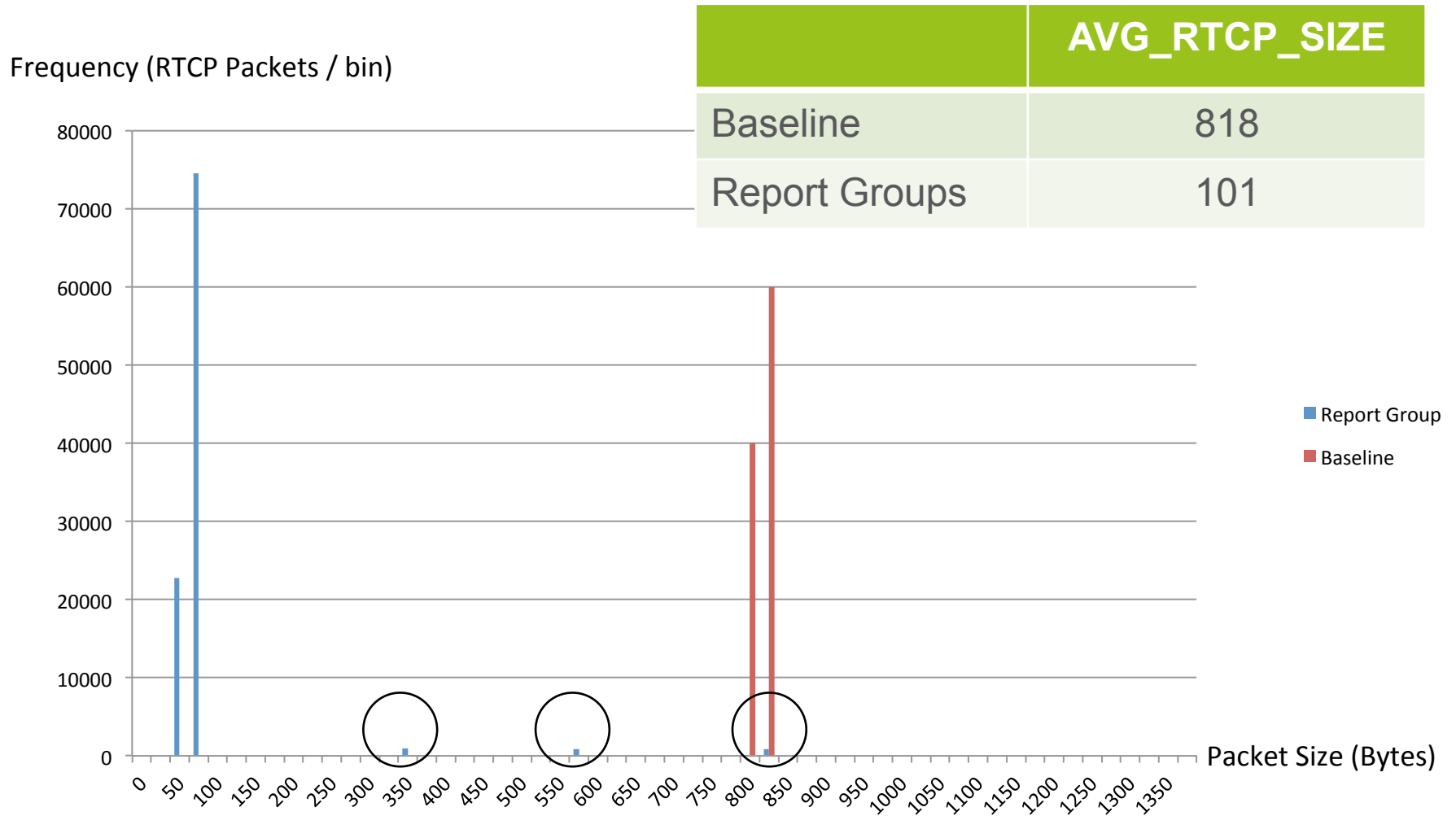


Frequency (RTCP Packets / bin)



# SFM Use case Results

## Packet Size Distribution



# Conclusions



- › Report Groups are as effective as we expected
  - Allows either
    - › More frequent reporting
    - › Reduced consumption for regular reporting
- › Significant improvements
  - Even in quite small sessions of the RTC use case
- › Gain should be even more with SSRC Aggregation



# Next Steps



## › [draft-ietf-avtcare-rtp-multi-stream-01](#)

- SSRC Aggregation Issue

- › Needs proposals for solutions

- Simple to implement

- Maintain RTCP Bandwidth Target

- Need to look at effects of RTCP packet burst of joining multi-SSRC endpoint

## › [draft-ietf-avtcare-rtp-multi-stream-optimisation-00](#)

- Resolve editorial and missing sections