



# Burst Timer Lengths' Simulation

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# Overview



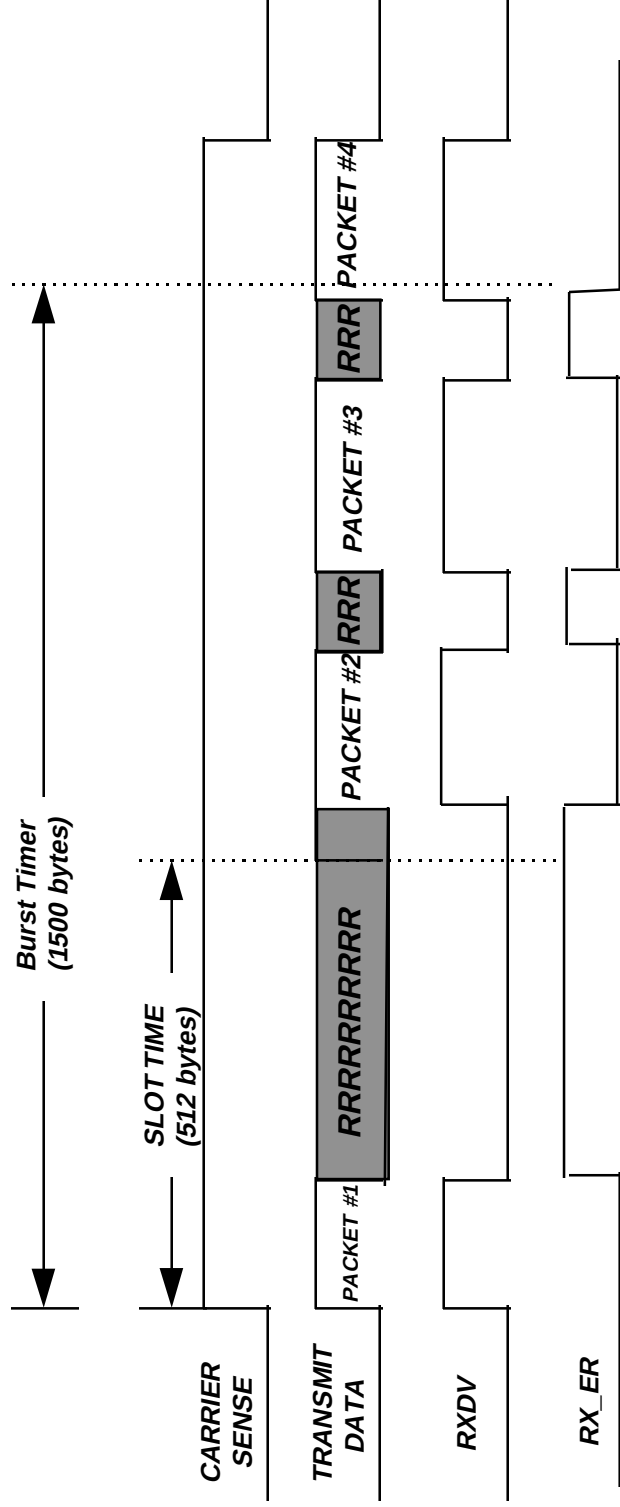
- Frame Bursting Review
- Burst Timer Lengths Experiments
- Simulation Results
- Observations
- Recommendations

# Frame Bursting: Review



- Frame Bursting is carrier extension plus a burst of packets
- Station transmissions are padded to slot time if necessary using carrier extension
- Subsequent to slot time, stations transmit packets with minimum IPG spacing until burst timer (1500 bytes) expires
  - Collision window has passed, so stations are guaranteed there are no collisions

# Frame Burst Timing



# Frame Bursting: Review



- As with baseline carrier extension, receiver is guaranteed to see only one packet during collision window.
- Subsequently, RXDV will delimit further packets
  - All these packets are guaranteed not to collide
- The de-assertion of CRS ends reception
- Maximum duration of carrier event is two 1500 byte packets

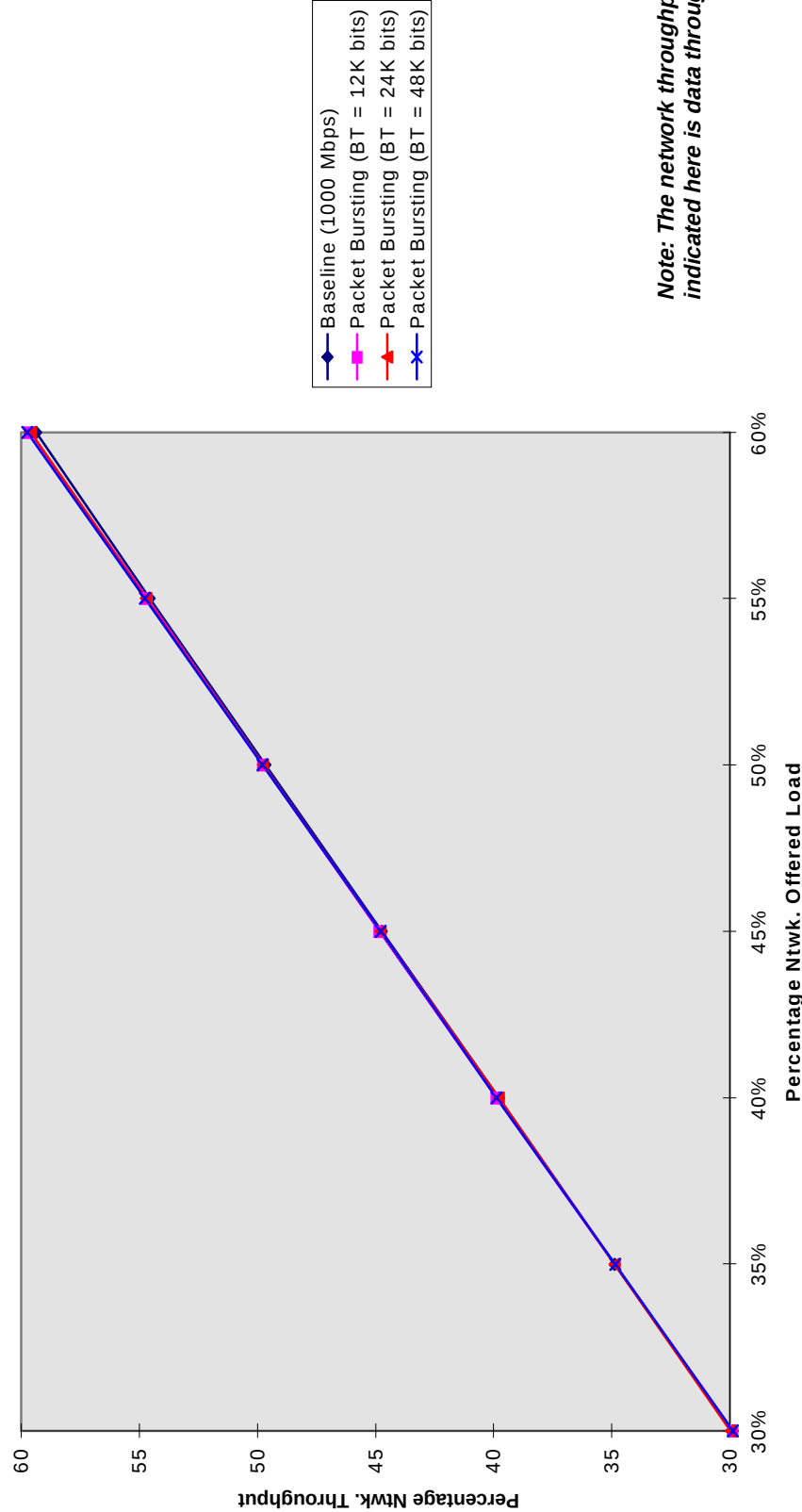
- Investigate the impact of increasing burst timer length on network performance
  - Uniform Loading across all stations
  - Non-uniform loading across all stations
- Performance Measures:
  - Packet End-to-End Delay
  - Access Latency

- **Experiment 1:**
  - Uniform loading across all stations
    - » 15 stations
    - » 200 m network diameter
  - Packet size distributions - Workgroup Average
  - Burst Timer Length :
    - » Baseline (No Frame Bursting)
    - » Burst timer lengths of 12K, 24K and 48K bits
  - Total Network Offered Load 30% - 60% in steps of 5%

# Simulation Results



Network Throughput Vs. Offered Load  
(15 stations, Uniform Traffic, Packet Size Distributions - Work group Average)

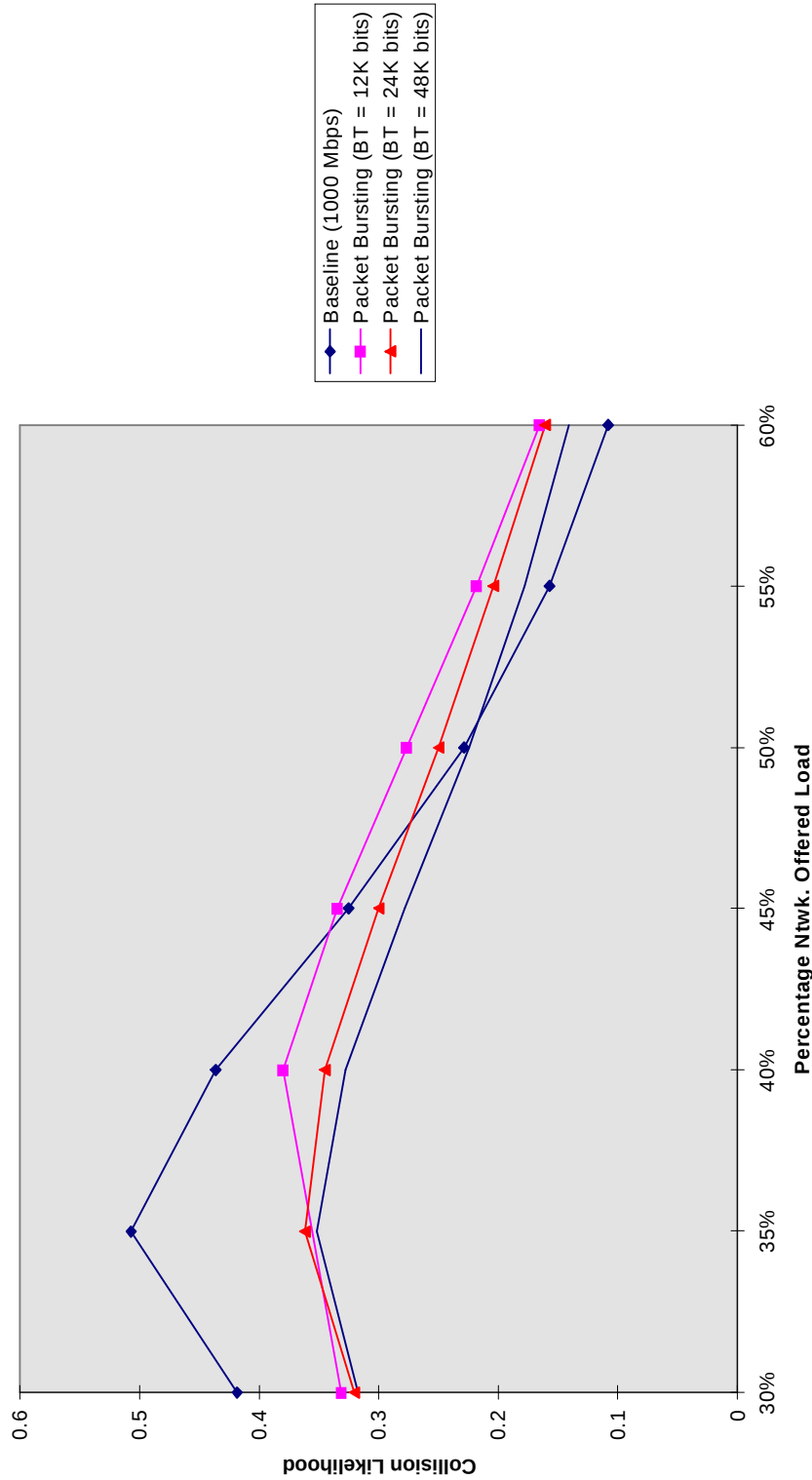


Note: The network throughput indicated here is data throughput

# Simulation Results



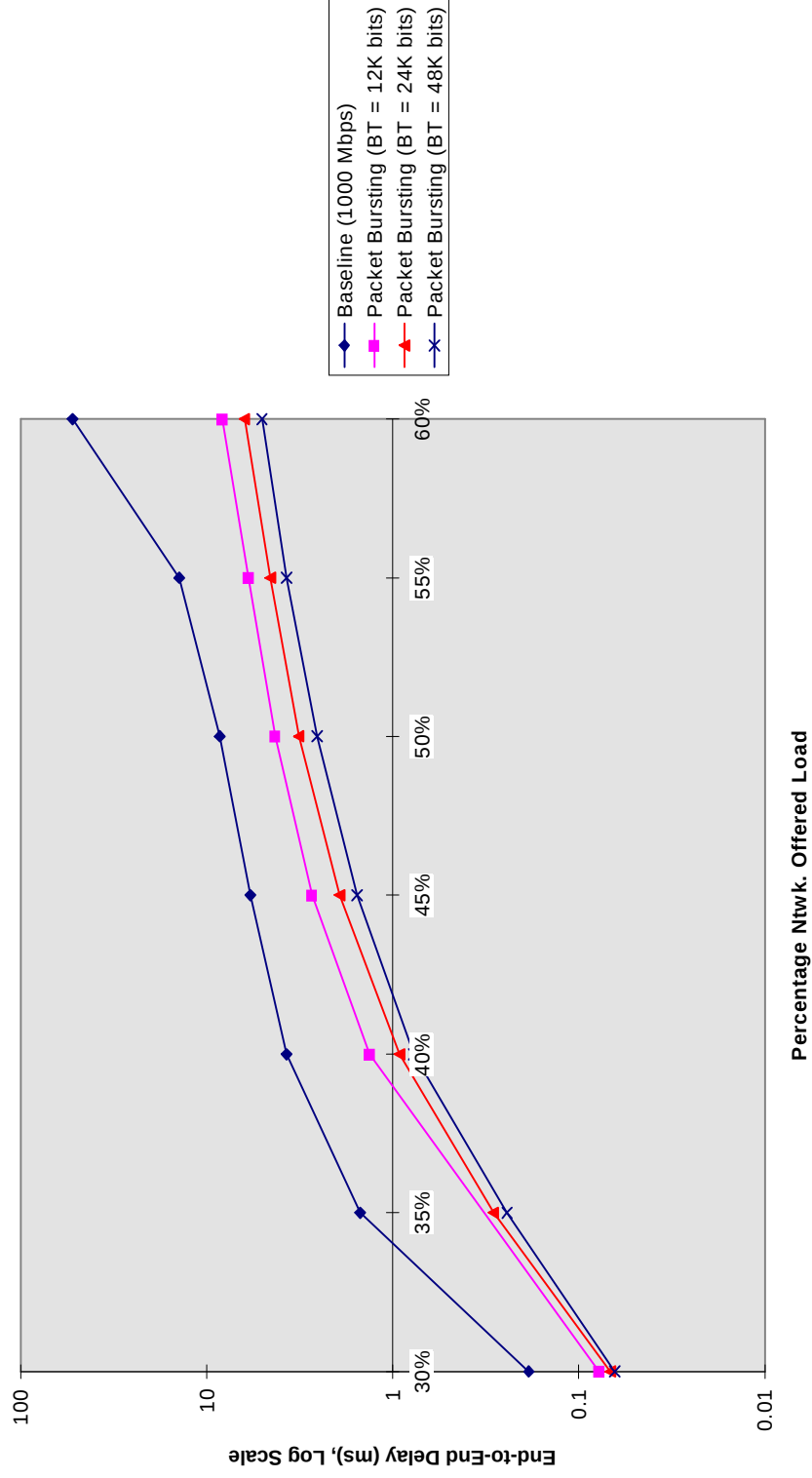
Collision Likelihood Vs. Offered Load  
(15 stations, Uniform Traffic, Packet Size Distributions - Work group Average)



# Simulation Results



Average End-End Packet Delay Vs. Network Offered Load  
(15 stations, Uniform Traffic, Packet Size Distributions - Work group Average)

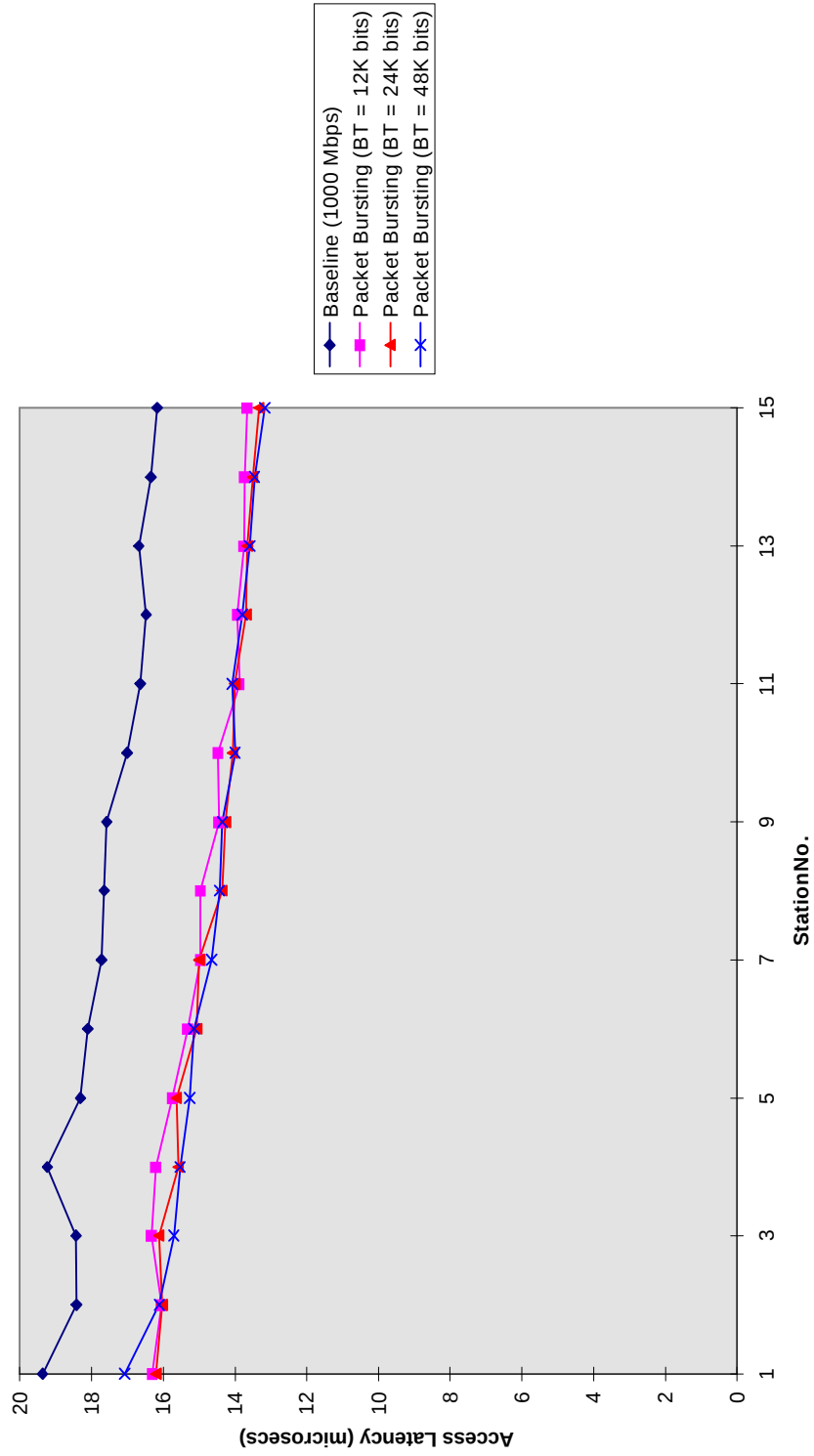


- Experiment 2:
  - Non-uniform loading across all stations
    - » 15 stations, station 1 - x% load, Station 2 - 2x% load  
..... station 15 - 15x% load
    - » 200 m network diameter
  - Packet size distributions - Workgroup Average
  - Burst Timer Length :
    - » Baseline (No Frame Bursting)
    - » Burst timer lengths of 12K, 24K and 48K bits
  - Total Network Offered Load 25% and 40%

# Simulation Results



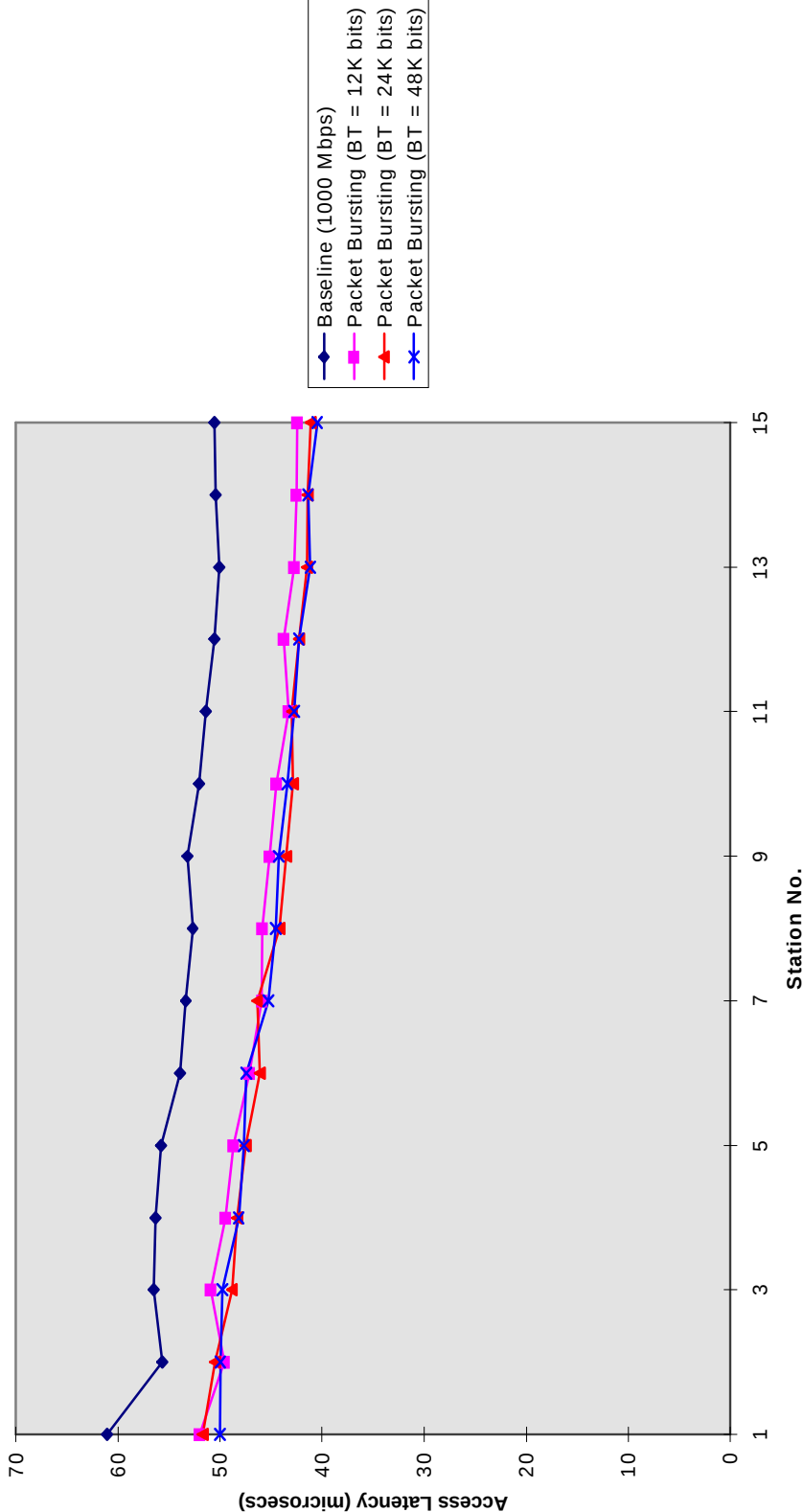
Mean Access Latency for Each Station at 25%. Network Offered Load  
(15 stations, Non Uniform Traffic, Packet Size Distributions - Work group Average)



# Simulation Results



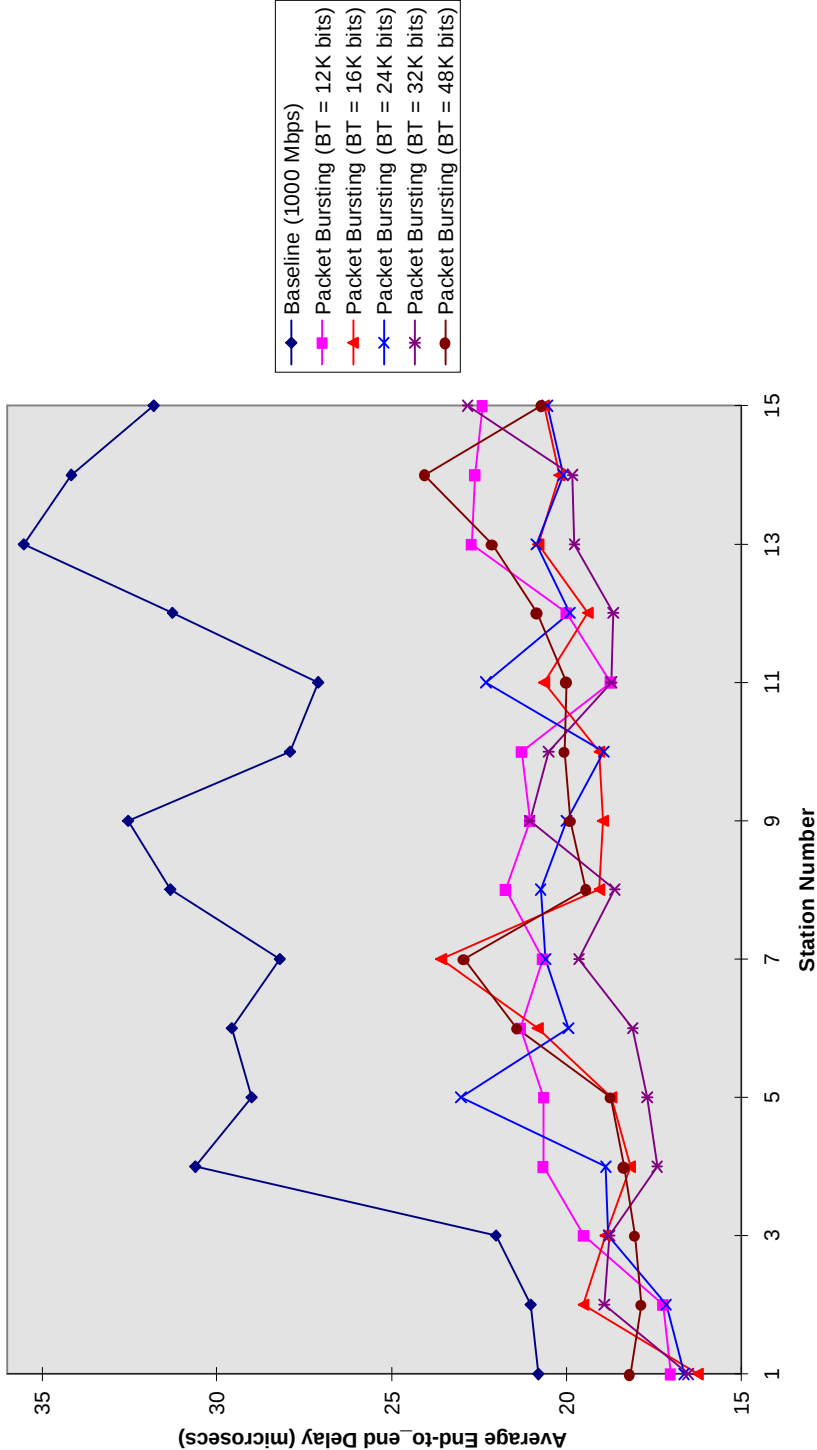
95th Percentile of Access Latency for Each Station at 25%. Network Offered Load  
(15 stations, Non Uniform Traffic, Packet Size Distributions - Work group Average)



# Simulation Results



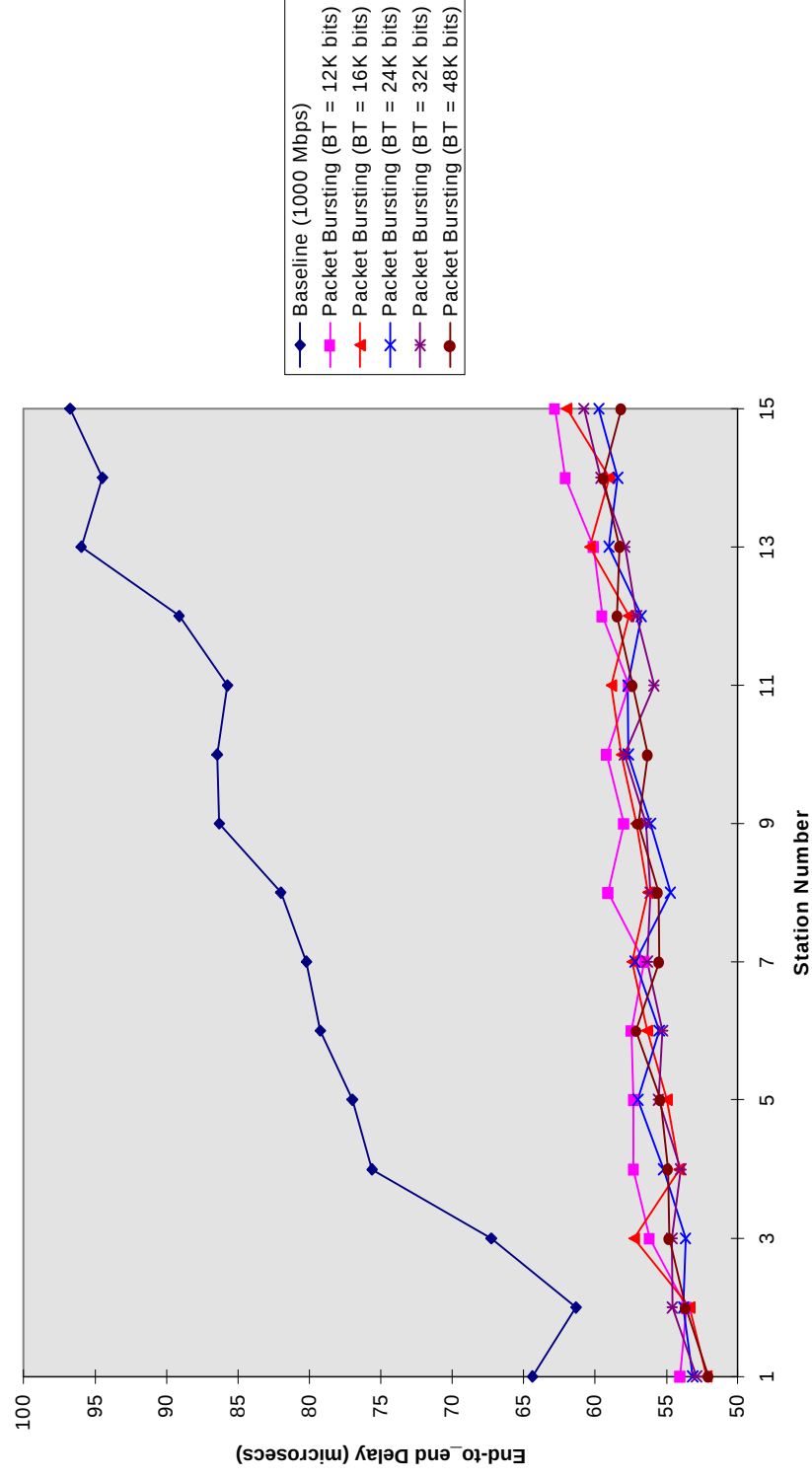
Average End-End Packet Delay for Each Station at 25% Network Offered Load  
(15 stations, Non Uniform Traffic, Packet Size Distributions - Work group Average



# Simulation Results



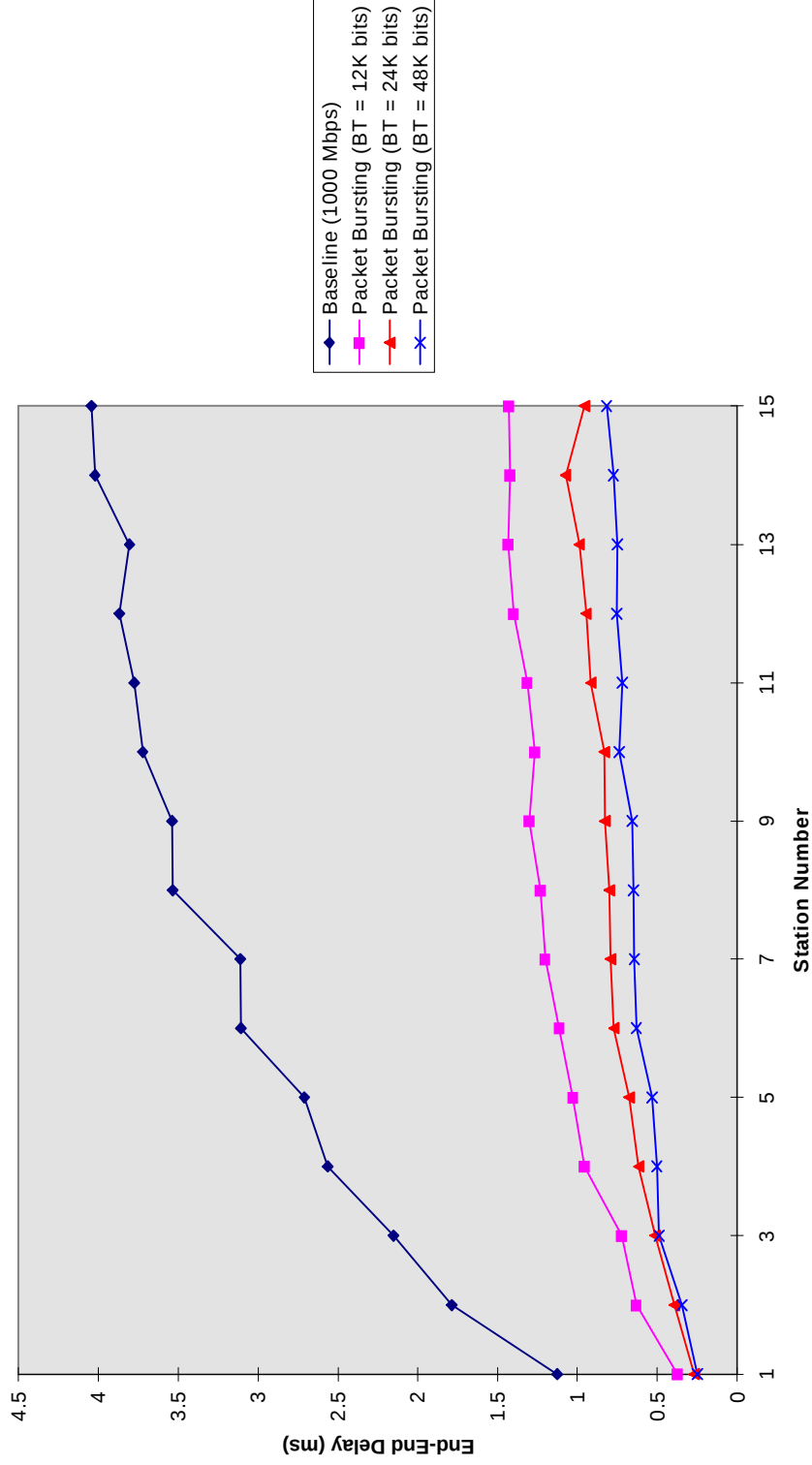
95th Percentile of End-End Packet Delay for Each Station at 25%. Network Offered Load  
(15 stations, Non Uniform Traffic, Packet Size Distributions - Work group Average)



# Simulation Results



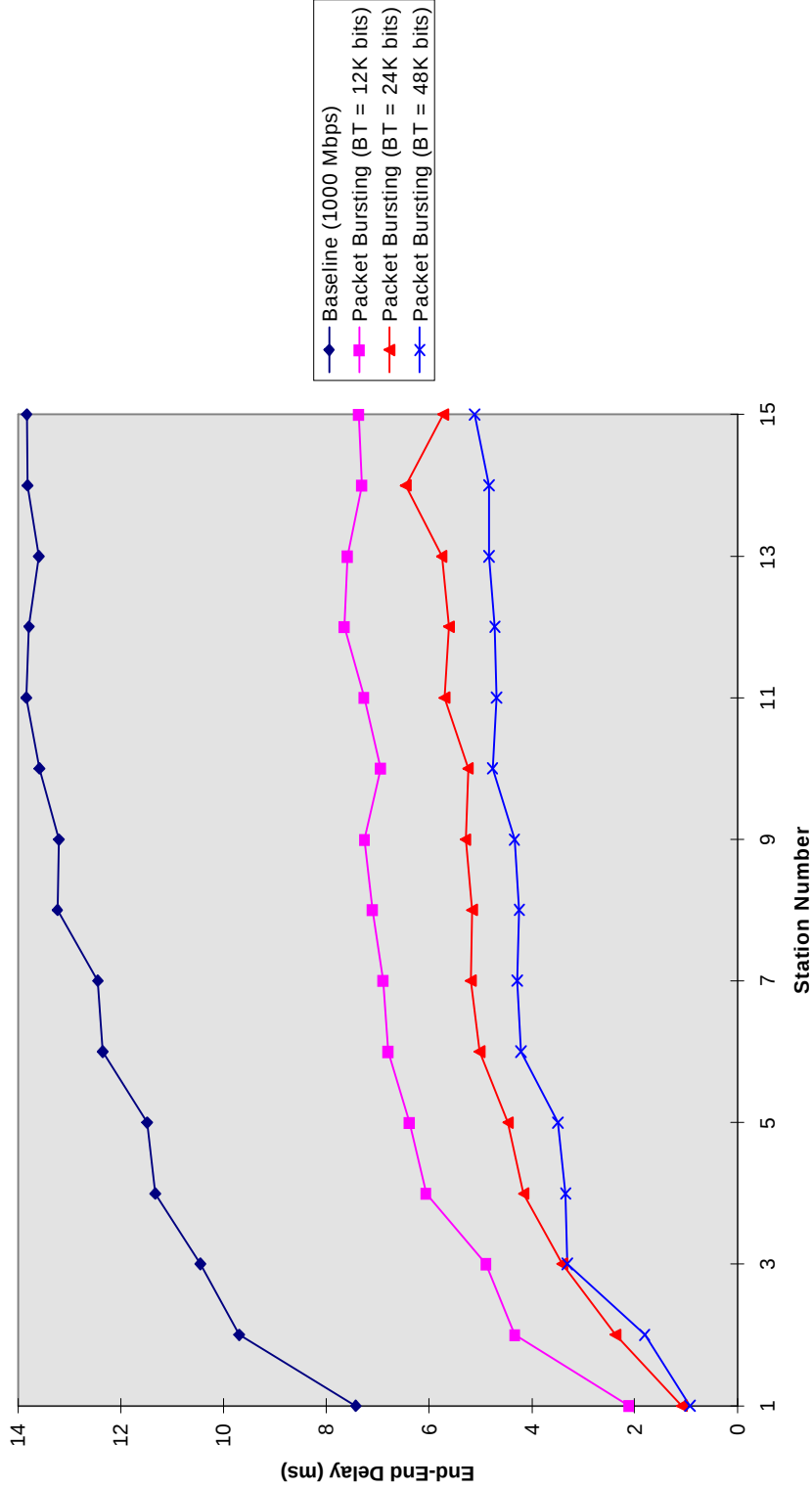
Average End-End Packet Delay for Each Station at 40%. Network Offered Load  
(15 stations, Non Uniform Traffic, Packet Size Distributions - Work group Average



# Simulation Results



95th Percentile of End-End Packet Delay for Each Station at 40%. Network Offered Load  
(15 stations, Non Uniform Traffic, Packet Size Distributions - Work group Average)



# Results Summary



- Significant improvement in performance is achieved when the burst timer length is at 12K bits; additional performance improvement is achieved in going to 24K bits.
- Minimal performance improvement is achieved by increasing burst timer length to 48K bits. Performance unfairness may result between stations in a network with non-uniform loading.

# Results Summary



- Capture Effect does not increase with increase in burst timer length as one would expect; Instead, it is mitigated because of decrease in collision likelihood at the same offered load when compared with baseline.

# Recommendations



- A burst length of 24000 bits is recommended. However, with a burst length of 12000 bits, most of the performance improvement is seen for uniform and non-uniform loading case.
- If necessary to keep the burst timer a multiple of 512 bytes, set the burst length timer at 16K bits; Additional (minimal) performance improvement to be expected with burst length timer of 32K bits.