EGVRP Simulations

Guyves Achtari

Paul Bottorff

Convergence time simulation of GVRP/EGVRP

- These simulations study the convergence time of a Service Provider network with GVRP and EGVRP in a synchronized start-up scenario
  - The simulation measures the time it takes from the synchronized start-up for all provisioned S-VLANs, to be registered with every database of every node on the registration path

What is EGVRP?

- **EGVRP extends the supportable number of VLANs in the network to as many as 16,777,214 (2^{24} -2)**
  - **EGVRP defines the Unified Address Size, a global configuration parameter in the network which shows how many bits of each VLAN tag is used**
  - **EGVRP defines two packing schemes**
    - **Sparse mode: same as GVRP**
    - **Dense mode: encodes every 4096 VLANs in one PDU**

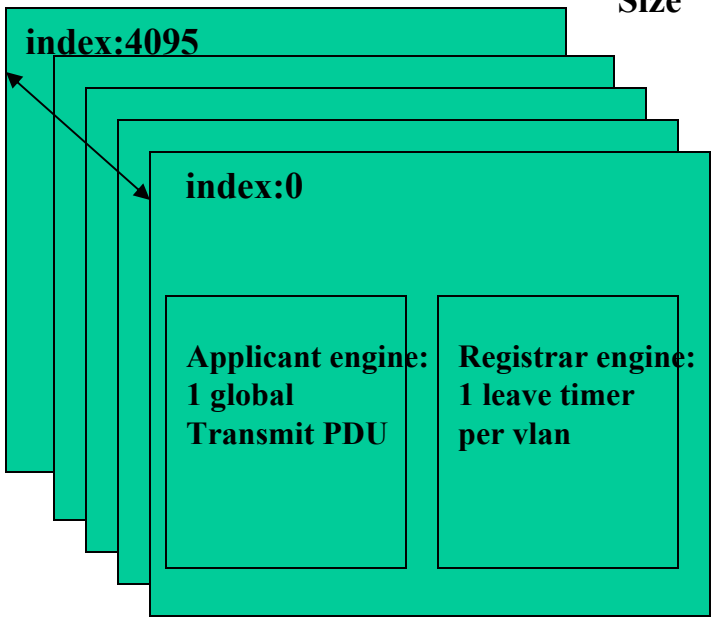
EGVRP dense mode

The Unified Address Size is a global parameter. It configures all databases on each bridge with the number of bits defined in every VLAN tag

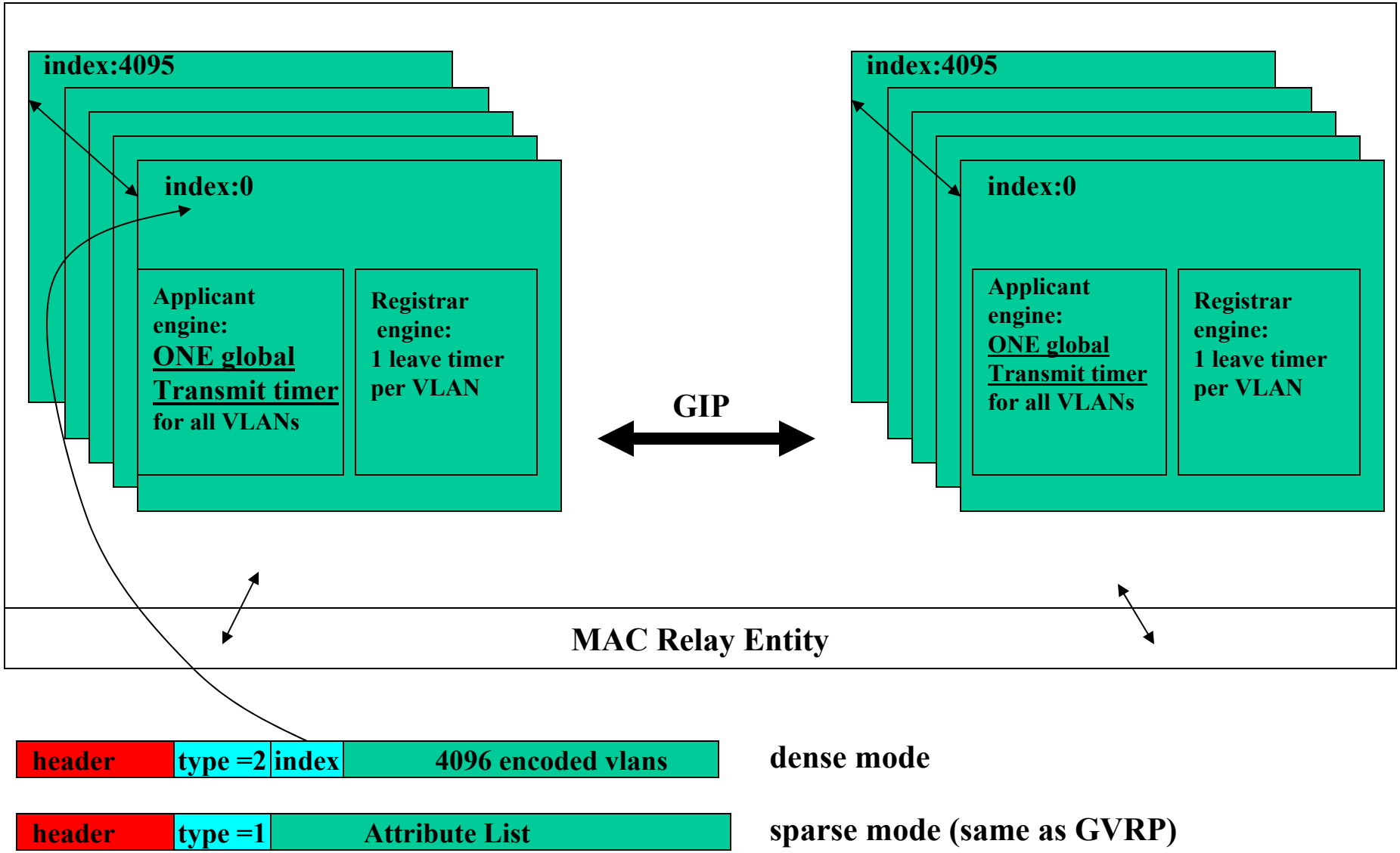
index	range			
4095	16773120	…	16777217	2^^24
	…….			
5	20482	…	24577	2^^15
4	16386	…	20481	2^^15
3	12290	…	16385	2^^14
2	8195	….	12289	2^^14
1	4098	….	8193	2^^13
0	1	…..	4097	2^^12

MIB: Unified Address Size

dense mode



EGVRP database and packing model



Dense packing with EGVRP

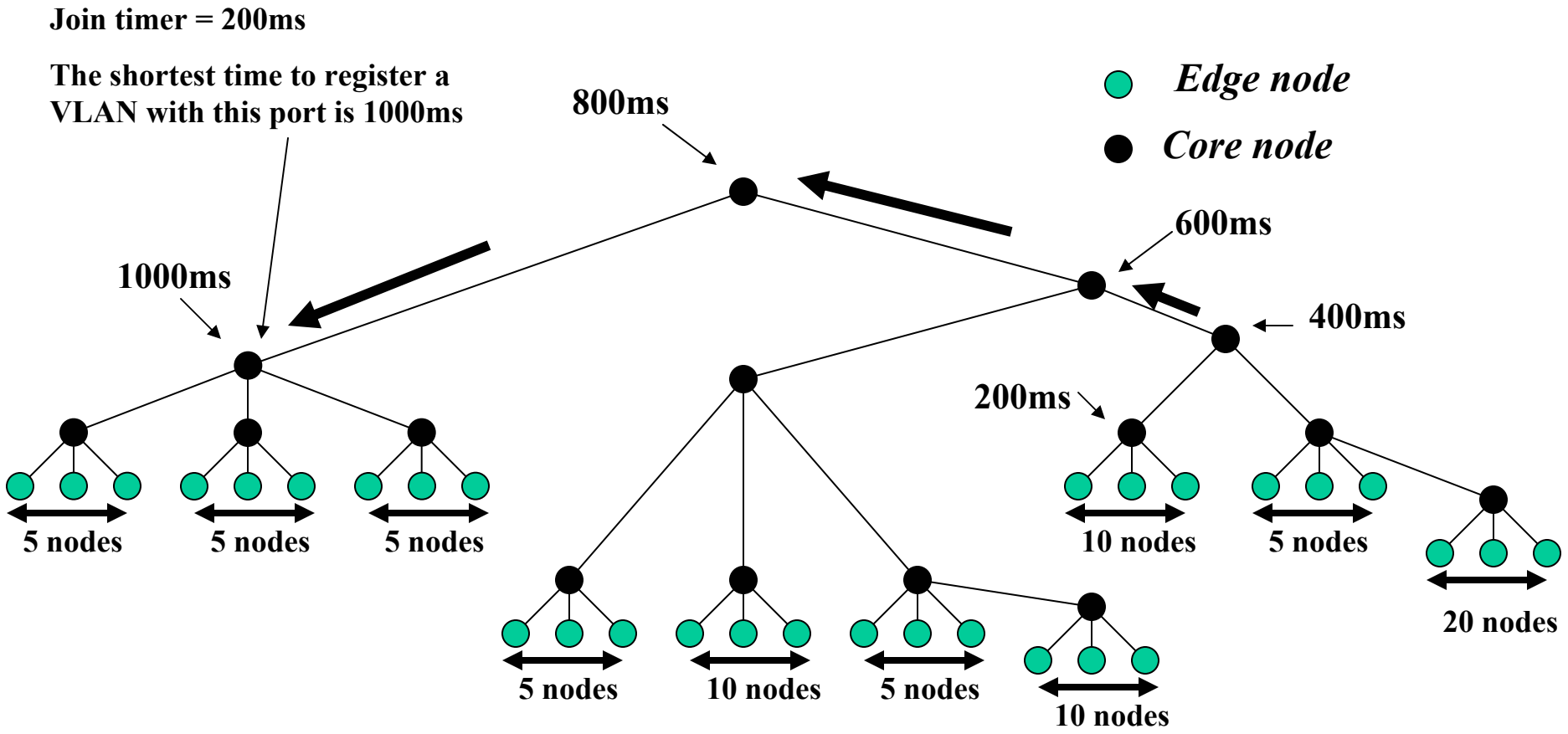
- **GVRP requires 4 bytes to encode every S-VLAN up to 16 bits wide. S-VLANs 16 to 24 bits wide require 5 bytes.**
- **EGVRP dense mode encodes every 4096 S-VLANs in one frame of 1500 bytes.**

Bits	# PDUs with GVRP	# PDUs with EGVRP
12	11	1
16	176	16
18	877	256
24	56112	4096

Network simulation and initial condition

- **Simulations with a network of 80 edge nodes, and a total of 95 nodes**
- **2^{12} to 2^{24} S-VLANs provisioned on each edge port of each edge node of the simulated network**

Simulated Network
(80 edge nodes, 95 nodes total)



GVRP/EGVRP Simulation assumption

- **There is one join Timer for each participant on every port (excluding ports at the edge of the service provider network)**

- **All messages are terminated at the edge of the service provider network.**

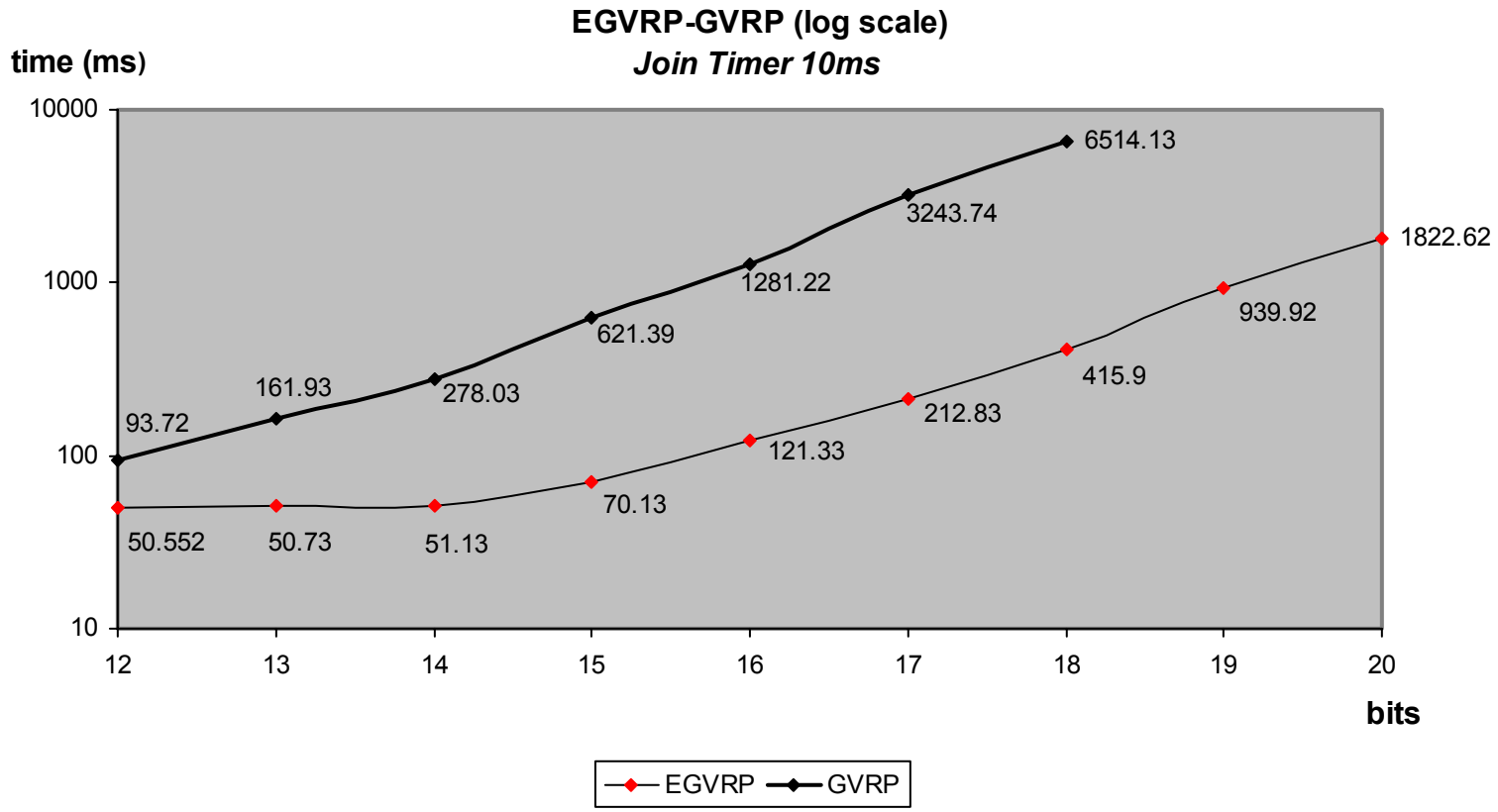
- **Traffic generated by the LeaveAll messages and state machines not considered**.

Processing time parameter assumption 10’000 PDUs per second

- **Processing of every incoming or outgoing PDU has been set to 100us**

- **As a result a maximum of 10000 PDUs per second can be processed by each node**

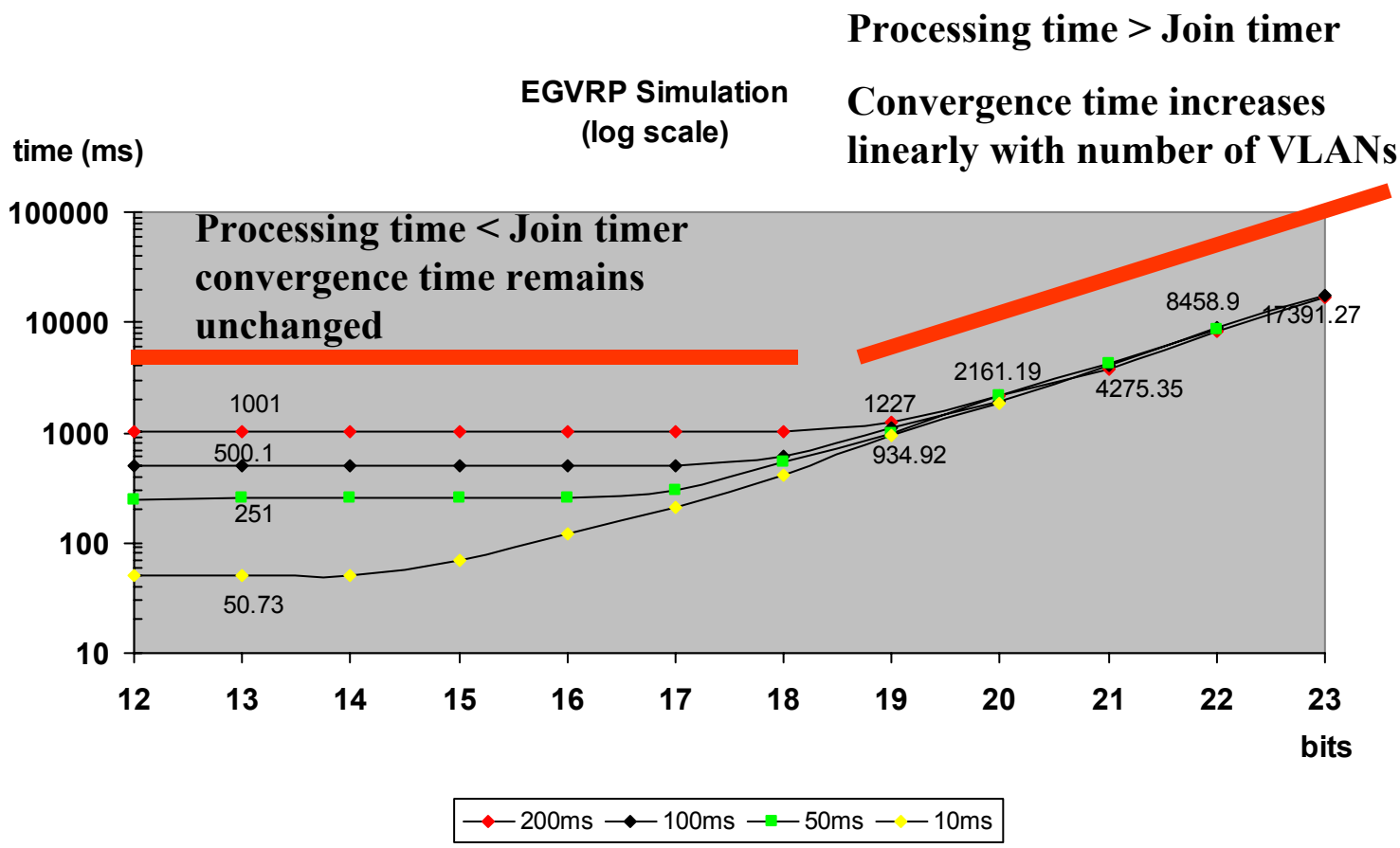
Comparison between GVRP and EGVRP convergence time (join Timer = 10ms)



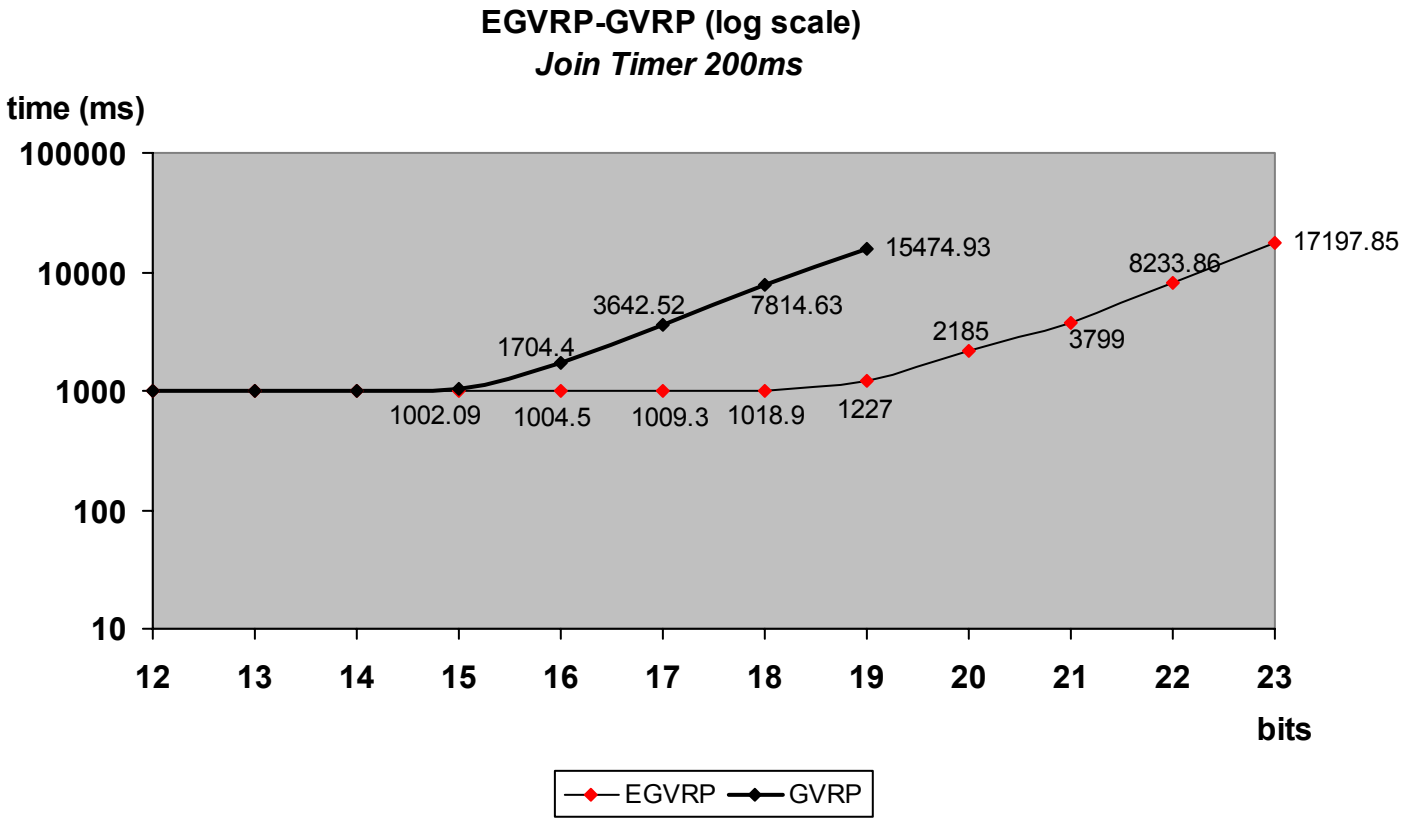
EGVRP convergence time remains almost unchanged for up to 2^{15} S-VLANs.

This is about 9 orders of magnitude faster than GVRP

EGVRP convergence time (Join timer = 10, 20, 50, 200 ms)



Comparison between GVRP and EGVRP convergence time (join Timer = 200ms)



Fast convergence with EGVRP

- **EGVRP's performance over GVRP increases as the number of provisioned S-VLANs increases, and/or the Join timer decreases.**
  - **A Service Provider network consists of physical point-to-point links. This allows for simplified GVRP/EGVRP state machines and very short join timer**
  - **Shorter Join timer and EGVRP's efficient packing scheme allow for faster convergence time**

BACKUP

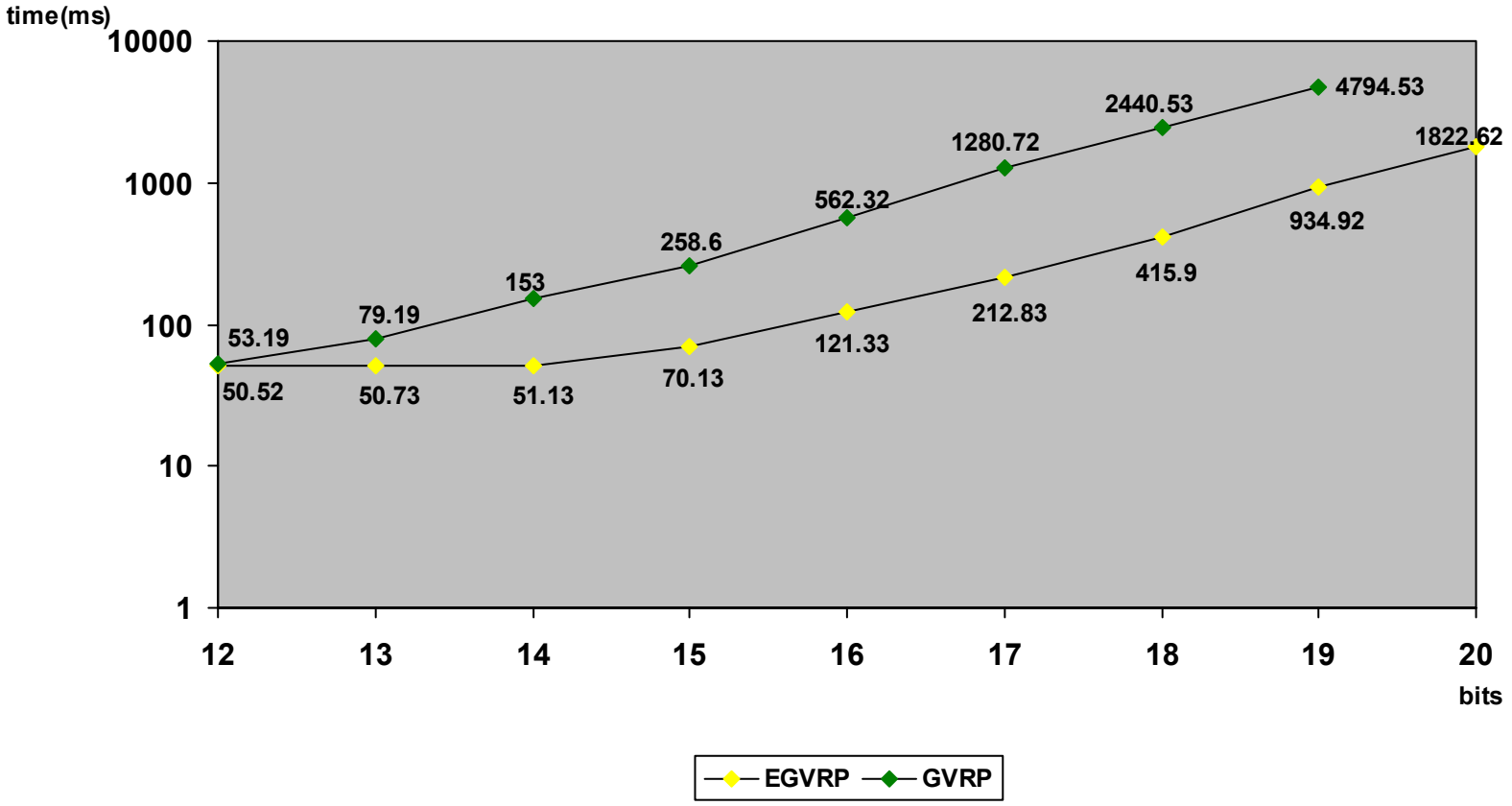
Additional Simulations

- **Same simulations have been performed with a smaller network, with 30 edge nodes, and a total of 42 nodes.**

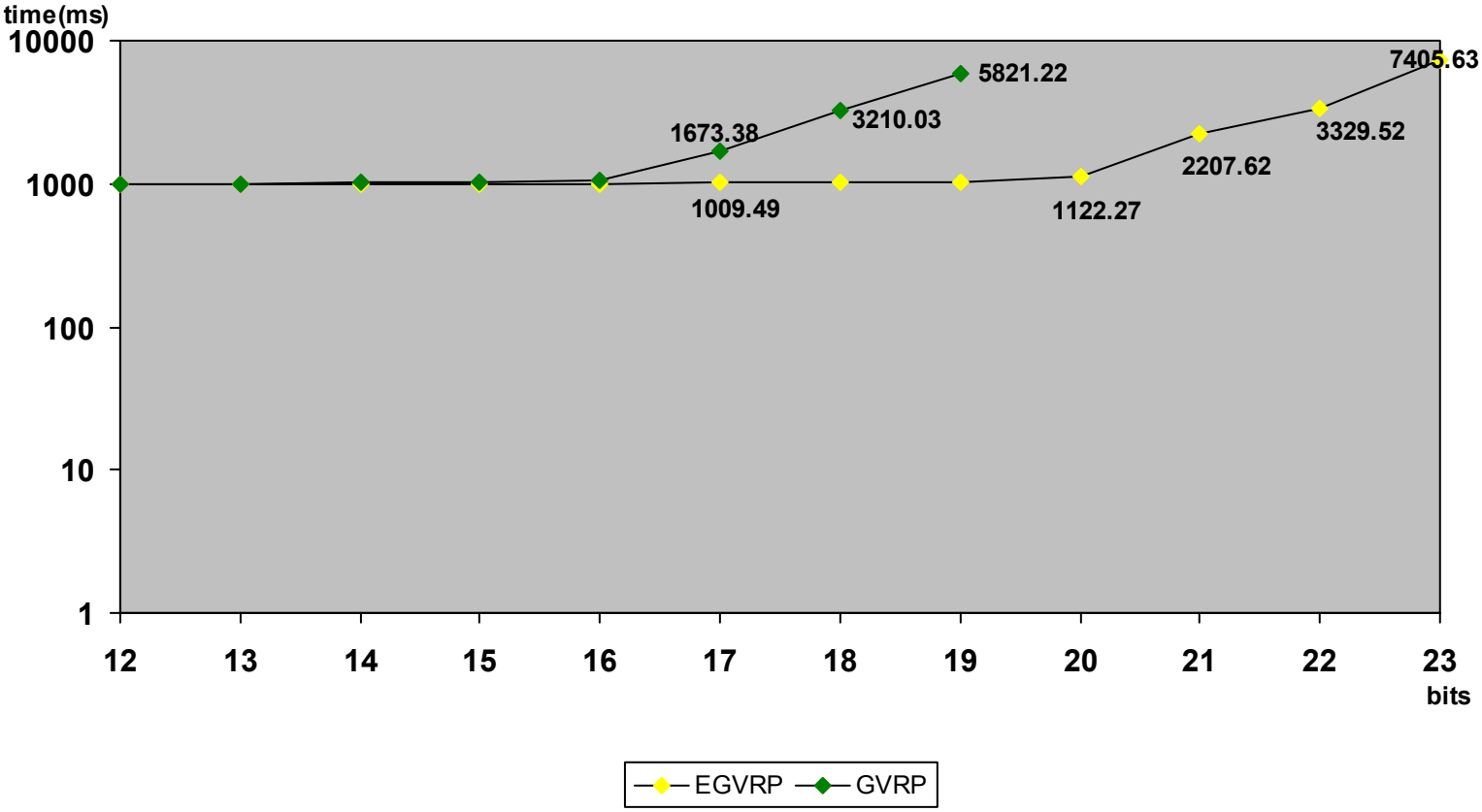
- **Again, 2^{12} to 2^{24} S-VLANs are provisioned on every edge port of every edge node**

- **All other parameters remain the same**

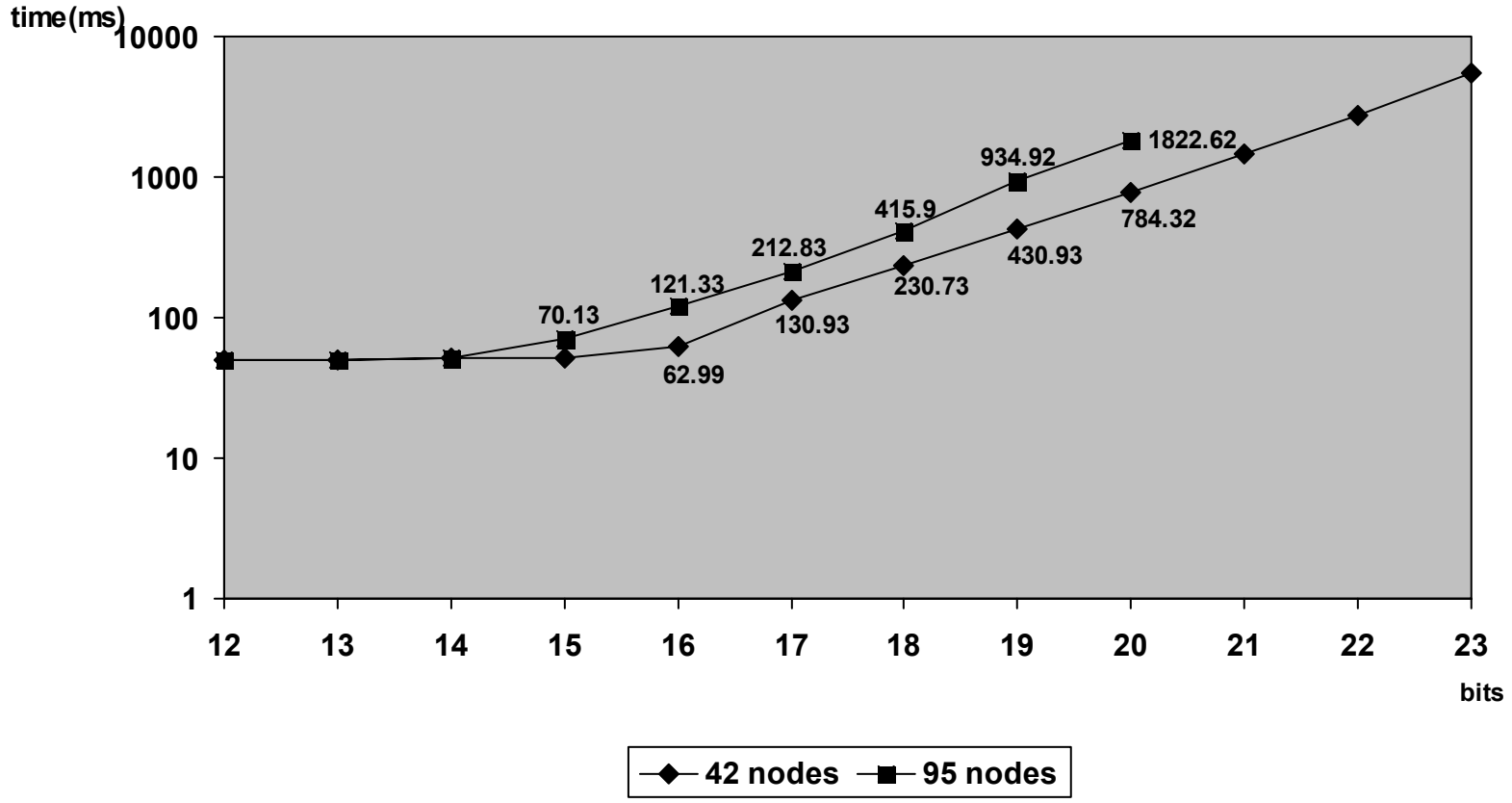
Comparison between GVRP and EGVRP convergence time (Join timer = 10) Total of 42 nodes, with 30 edge nodes



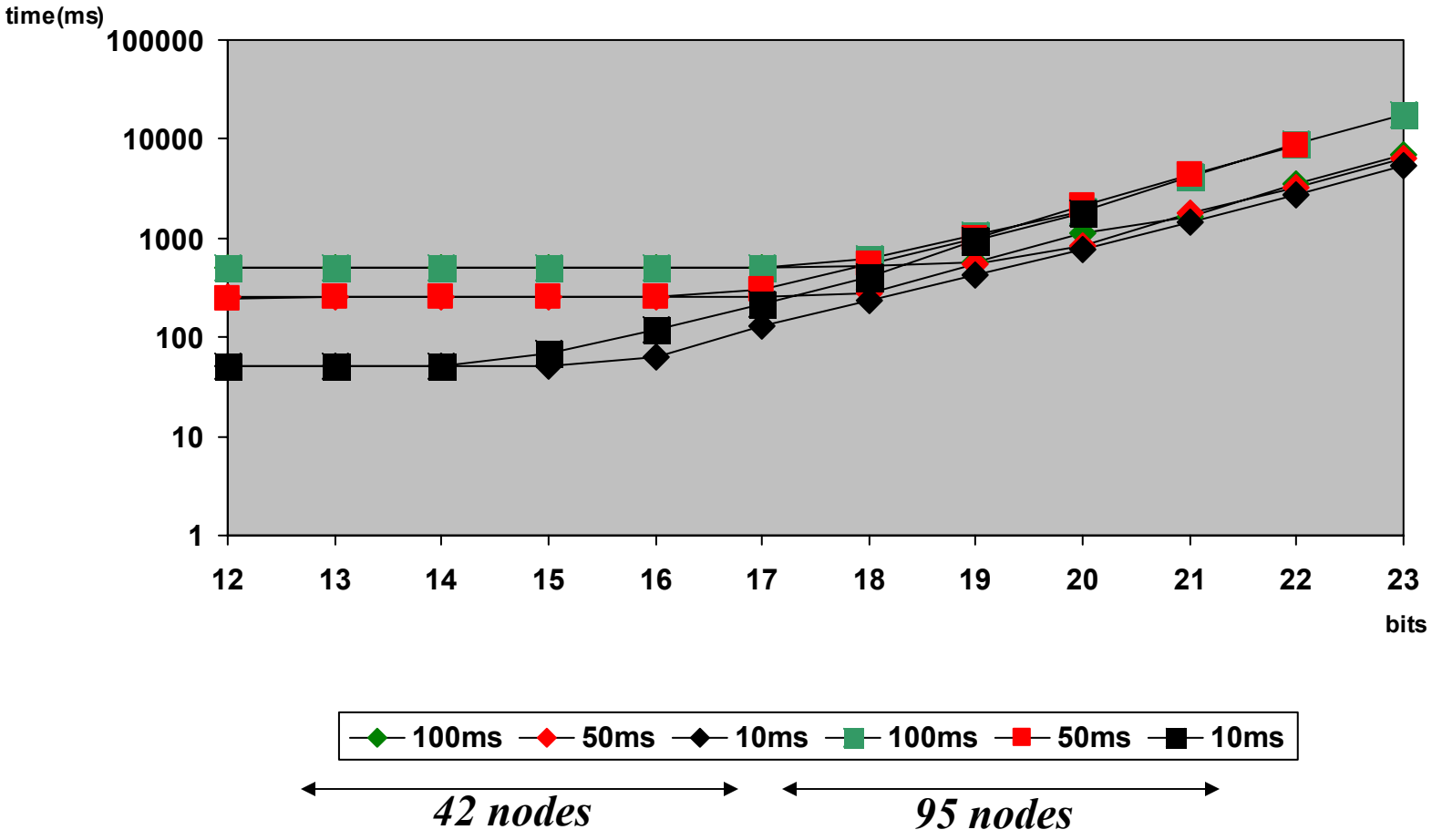
Comparison between GVRP and EGVRP convergence time (Join timer = 200) Total of 42 nodes, with 30 edge nodes



Comparison of EGVRP convergence time between a network of 95 nodes, and a network of 42 nodes (join timer = 10 ms)

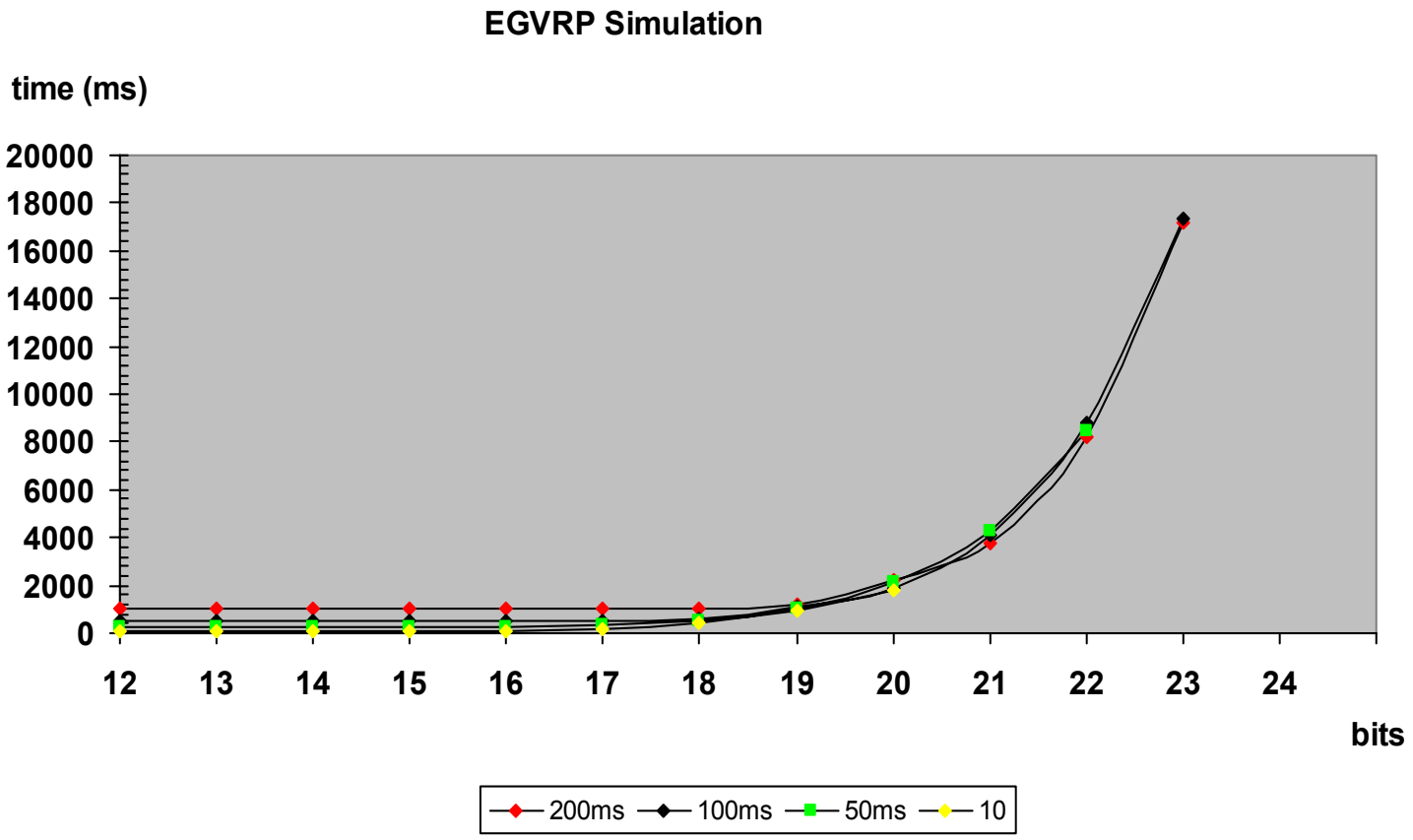


Comparison of EGVRP convergence time between a network of 95 nodes, and a network of 42 nodes (join timer = 10, 50, 100 ms)

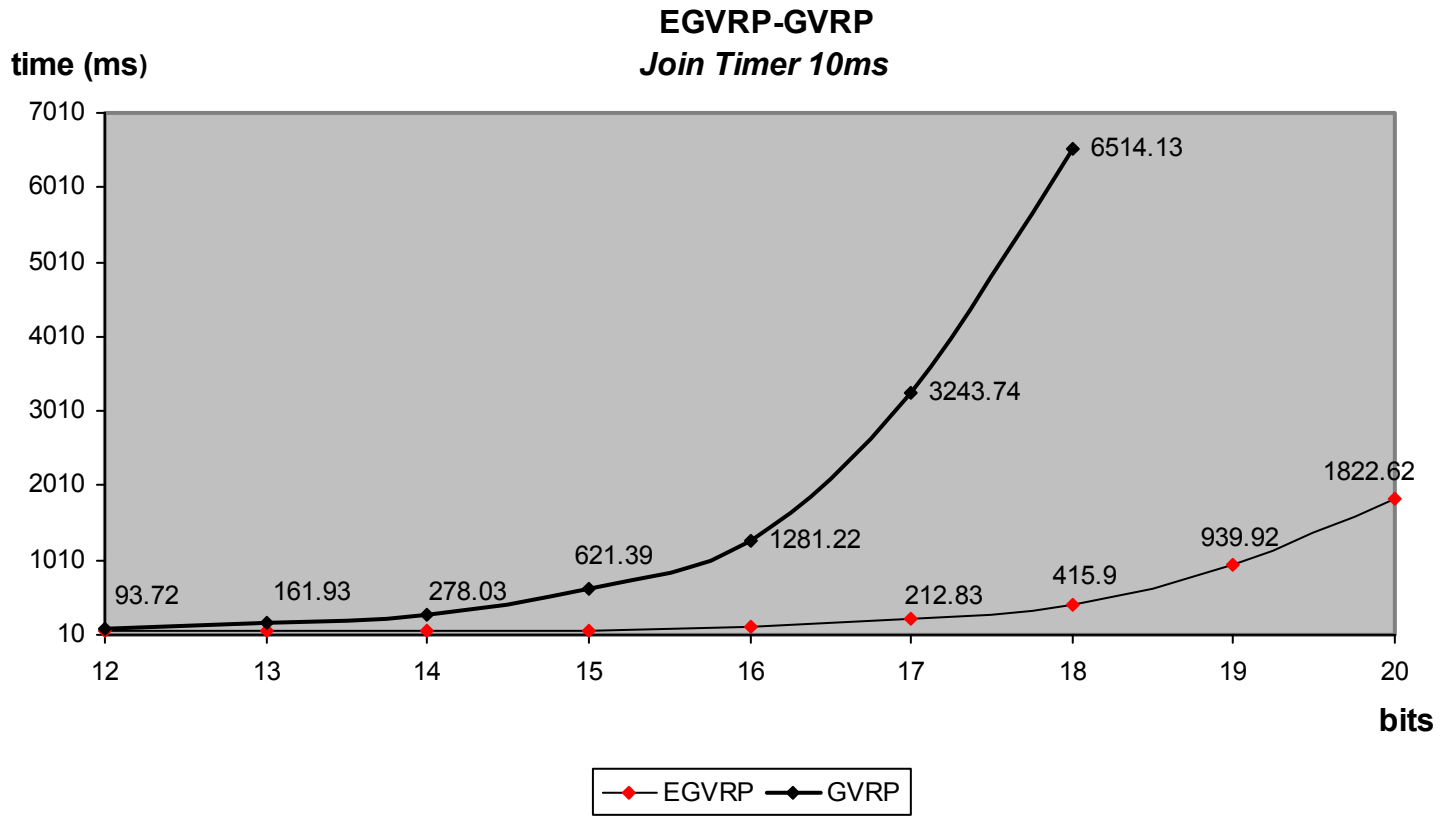


EGVRP convergence time with 95 nodes

(Join Timer = 10, 50, 100, 200 ms)



Comparison between GVRP and EGVRP convergence time with 95 nodes (join Timer = 10ms)



Comparison between GVRP and EGVRP convergence time with 95 nodes (join Timer = 200ms)