CICS Transaction Gateway for z/OS V8.1

Performance summary

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Rob Jones
rcjones@uk.ibm.com

Alan Hollingshead
alan_hollingshead@uk.ibm.com

CICS Transaction Gateway Development
IBM UK Laboratories
Hursley Park
Winchester
Hampshire
SO21 2JN

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Notices

This report is intended for Architects, Systems Programmers, Analysts and Programmers wanting to understand the performance characteristics of CICS Transaction Gateway for z/OS V8.1. The information is not intended as the specification of any programming interfaces that are provided by CICS Transaction Server for z/OS or CICS Transaction Gateway for z/OS V8.1.

It is assumed that the reader is familiar with the concepts and operation of CICS Transaction Gateway for z/OS V8.1.

References in this report to IBM products or programs do not imply that IBM intends to make these available in all countries in which IBM operates.

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The performance data contained in this report was measured in a controlled environment and results obtained in other environments may vary significantly.

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Overview

This document contains performance measurements for CICS Transaction Gateway for z/OS V8.1 used in conjunction with CICS Transaction Server for z/OS V4.1 and V4.2.

The report looks at CPU usage (including zAAP offload) for Gateway daemon and CICS address spaces, comparing EXCI and IPIC connections. It also looks at the scalability of the CICS TG and CICS TS solutions for EXCI and IPIC connections, the latter including CHANNEL payloads.

CICS Transaction Gateway and CICS Transaction Server were co-located (same LPAR and TCPIP stack), using EXCI and IPIC connectivity. The measurements were taken using the following configuration:

Hardware

- IBM System z: z10 2097-763 model E64
- 2GB of Central Storage (RAM)
- LPAR with 3 dedicated GCPs
- LPAR with 1 zAAP available *(zAAP offload scenario only)*
- IBM System x: x3550 M3 Intel® Xeon® 5600
- OSA-Express3 10GB Ethernet SR

Software

- CICS Transaction Gateway for z/OS V8.1
- CICS Transaction Server for z/OS V4.2 *(zAAP offload scenario only)*
- CICS Transaction Server for z/OS V4.1
- z/OS V1R12
- IBM 31-bit SDK for z/OS Java Technology Edition, Version 6.0.1
- SUSE Linux Enterprise Server 11

Workload

The workload simulation runs on an IBM System x machine running SUSE Linux Enterprise Server 11, using the CICS TG Java base classes to drive SYNCONRETURN ECI requests containing non-null payload data, thus avoiding null-stripping optimizations.

Terminology

“GCP” refers to an IBM System z General Purpose CPU.
“zAAP” refers to an IBM System z Application Assist Processor.
“CPU %” can be interpreted as CPU load (i.e. percentage load of 1CP).
“Cost per txn (ms)” refers to CPU usage per transaction, in milliseconds.
“TPS” refers to the number of Transactions Per Second.
“CICS TS” refers to IBM CICS Transaction Server for z/OS.
“CICS TG” refers to IBM CICS Transaction Gateway for z/OS.
“IPIC” refers to Internet Protocol (IP) interconnectivity.

zAAP offload with EXCI and IPIC connections

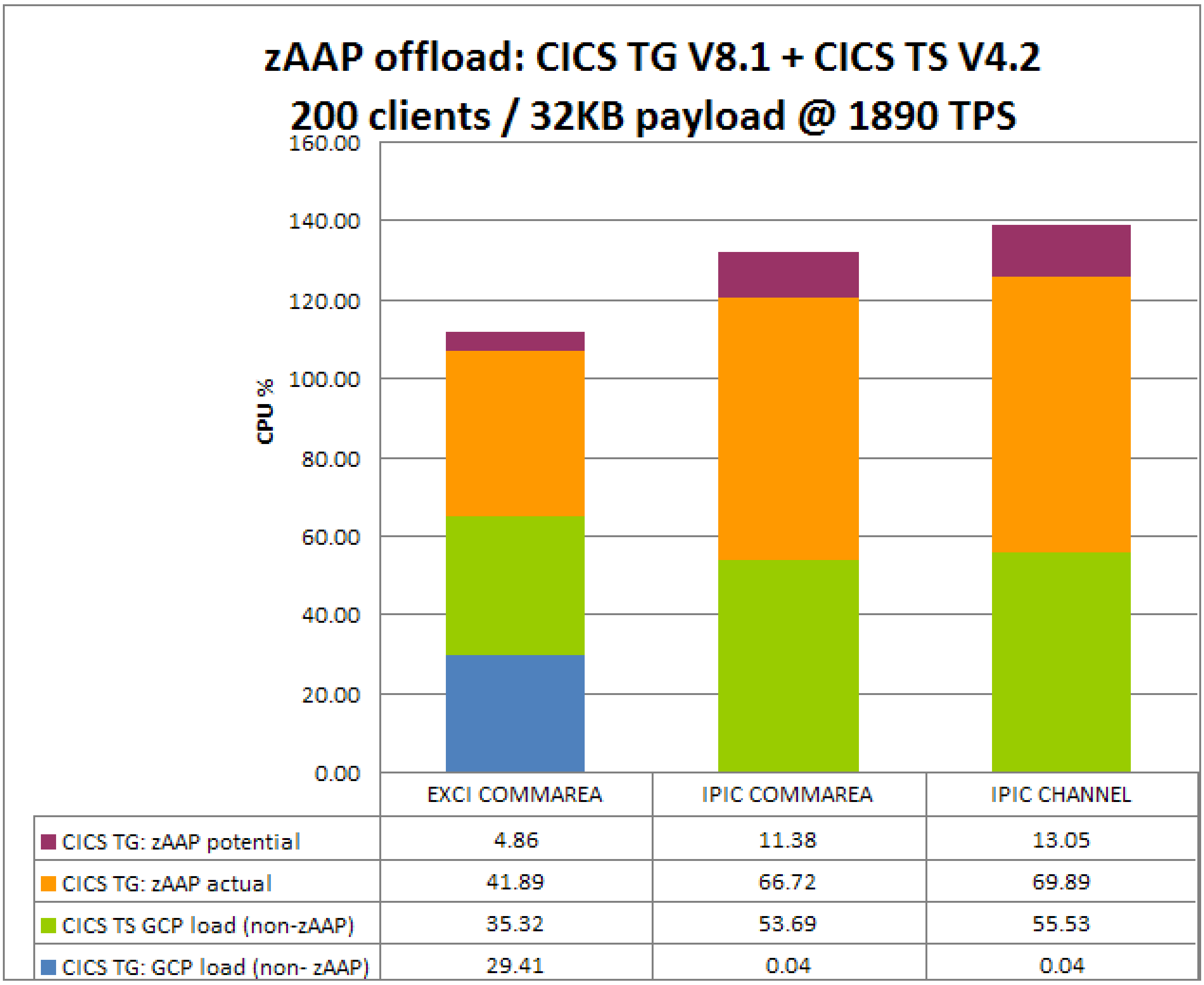

Illustration 1: zAAP offload potential using EXCI and IPIC

Notes

Illustration 1: zAAP offload potential using EXCI and IPIC shows that the total GCP load (blue and green bars combined) is lower for IPIC when zAAP offload is available. The CICS TG non-zAAP CPU load (blue) is so low that it is invisible on the graph.

Protocol / Payload	CICS TG CPU load zAAP eligible (%)	CICS TS+TG CPU load zAAP eligible (%)	GCP load %	Potential GCP saving with IPIC vs EXCI
EXCI / COMMAREA	61.38%	41.94%	58.06%	n/a
IPIC / COMMAREA	99.95%	59.24%	40.76%	**17.30%**
IPIC / Channel	99.95%	59.88%	40.12%	**17.94%**

Table 1: zAAP offload summary

In this scenario, we compared EXCI and IPIC (COMMAREA and CHANNEL) using the same payload size at an average transaction rate of 1890 TPS.

The single zAAP was unable to satisfy all of the eligible workload; the full potential offload is therefore represented by both green and blue areas on the graph.

Although the total path length is longer when using IPIC, the offload potential is such that GCP costs are lowered. Table 1: zAAP offload summary shows the zAAP eligibility for CPU loads in the CICS TG address space, and in context with CICS TS address space.

The observed overall reduction in general purpose CPU load (>17%) makes IPIC connectivity an attractive option for zAAP owners. This reduction in CPU load has been measured with 32KB payload sizes. Analysis of other payload sizes, at other transaction rates have not been completed at this time, and there is no guarantee that equivalent reductions will be observed in other configurations.

CICS TG V8.1 was used with CICS TS V4.2 in this scenario. A single zAAP was active for this scenario.

EXCI versus IPIC payload scaling with COMMAREA

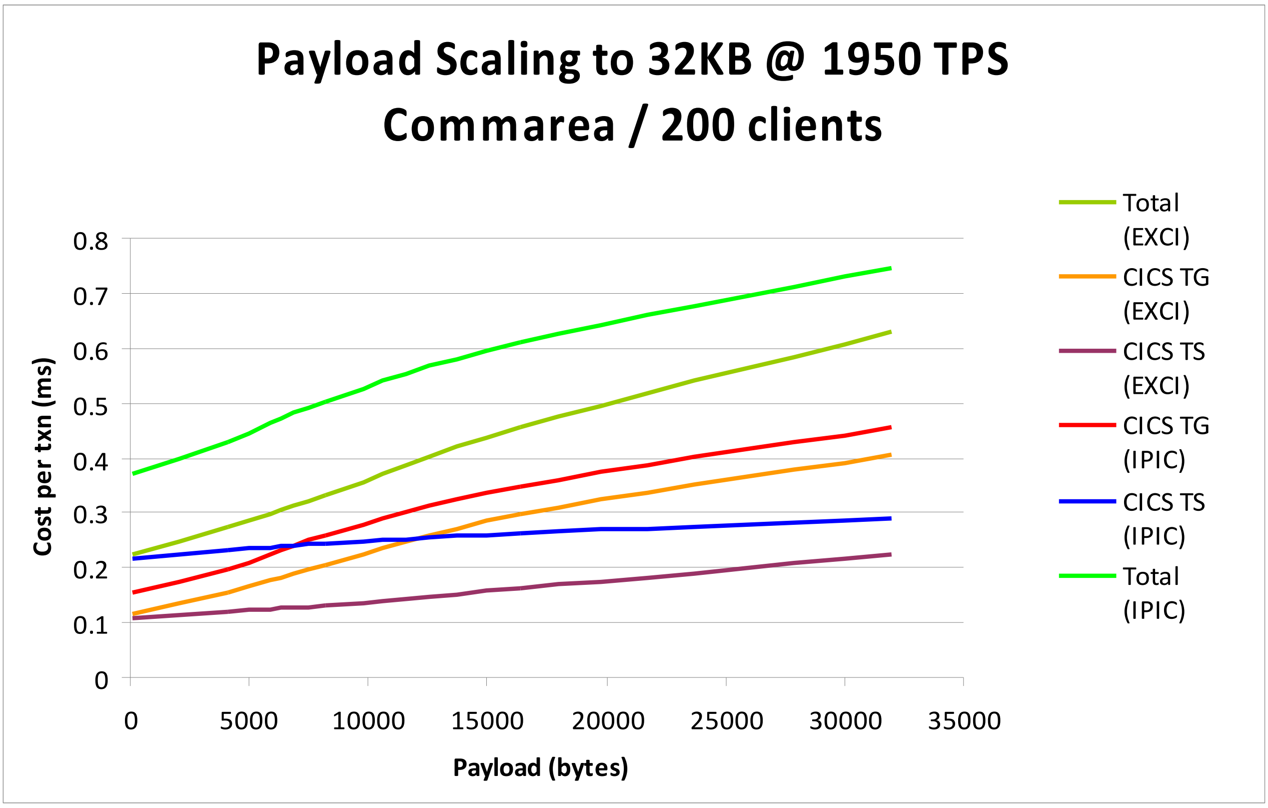

Illustration 2: Payload scaling comparing EXCI and IPIC

Notes

In this scenario, the CICS TG Gateway daemon address space and CICS TS region are co-located within a z/OS LPAR. The graph directly compares CPU costs in the Gateway daemon and CICS region for both EXCI and IPIC connections.

The workload utilized 200 client applications sending requests at a fixed transaction rate (average 1950 TPS). CPU cost per transaction was measured in both CICS TG and CICS TS address spaces, whilst the size of the payload was increased from 100 bytes to 32KB.

Both CICS TG and CICS TS address spaces demonstrate good scalability across the possible range of COMMAREA payload sizes, but the increased path length for IPIC is clearly evident.

CICS TG V8.1 was used with CICS TS V4.1 in this scenario. No zAAP was active for this scenario.

IPIC payload scaling with Channels

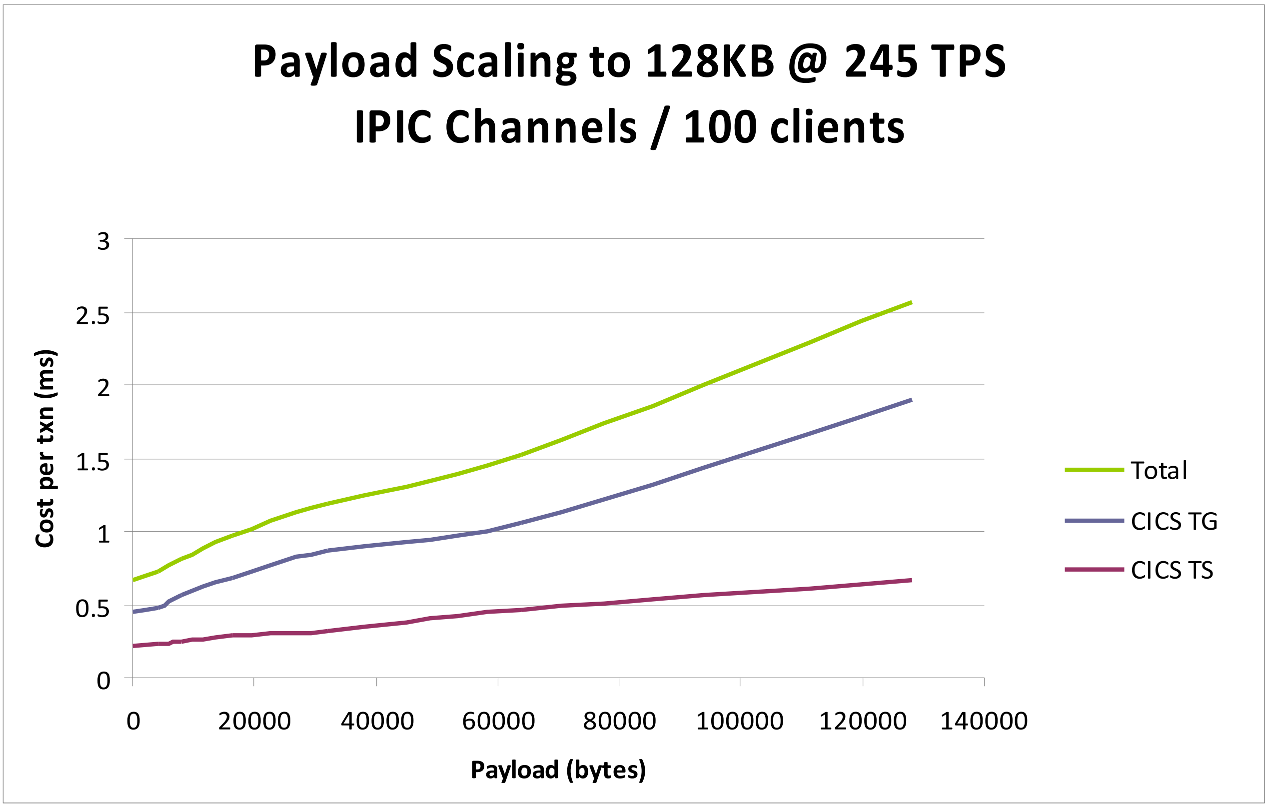

Illustration 3: Payload scaling with IPIC Channels

Notes

In this scenario, the CICS TG Gateway daemon address space and CICS TS region are co-located within a z/OS LPAR and connected using IPIC (Fast Local Sockets). The workload utilized 100 client applications sending requests at a fixed transaction rate (average 245 TPS). CPU cost per transaction was measured in both CICS TG and CICS TS address spaces, whilst the size of the payload was increased from 100 bytes to 128KB.

Both CICS TG and CICS TS address spaces demonstrate good scalability across a range of Channel payload sizes.

CICS TG V8.1 was used with CICS TS V4.1 in this scenario. No zAAP was active for this scenario.

EXCI workload scaling with COMMAREA

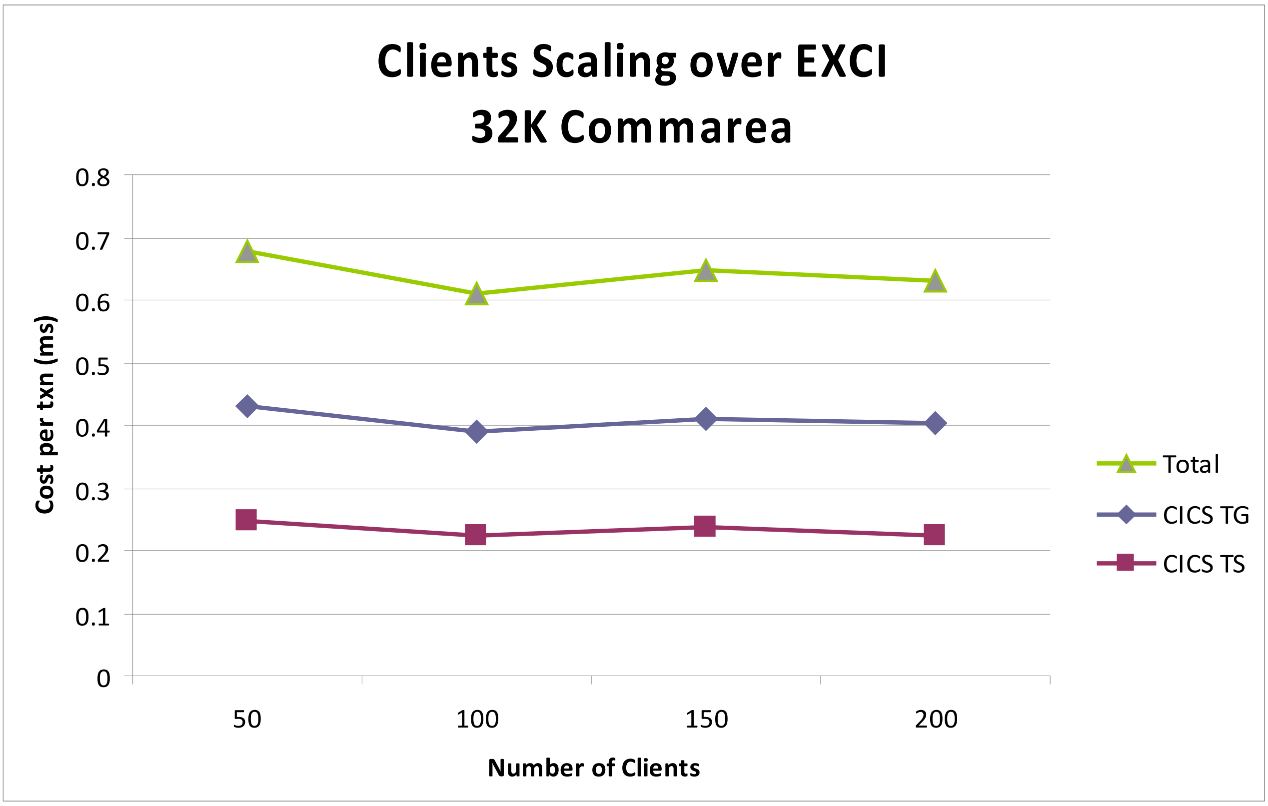

Illustration 4: Workload scaling with EXCI

Notes

In this scenario, the CICS TG Gateway daemon address space and CICS TS region are co-located within a z/OS LPAR and connected using EXCI. The workload consisted of a fixed-size COMMAREA payload of 32KB, whilst the number of client applications increased. Each client was sending requests at a fixed transaction rate. The transaction rate in the Gateway rose linearly in direct proportion to the number of clients.

CPU cost per transaction was measured in both CICS TG and CICS TS address spaces, whilst the number of clients was increased from 50 (485 TPS) to 200 (1921 TPS).

The range of scaling analyzed here was limited to between 50 and 200 clients. As we were only using a single Gateway daemon with EXCI rather than a highly available Gateway group, the hard limit of concurrent requests 250 (due to LOGONLIM).

Both CICS TG and CICS TS address spaces demonstrate a predictable CPU cost per transaction as the workload scaled.

CICS TG V8.1 was used with CICS TS V4.1 in this scenario. No zAAP was active for this scenario.

IPIC workload scaling with Channels

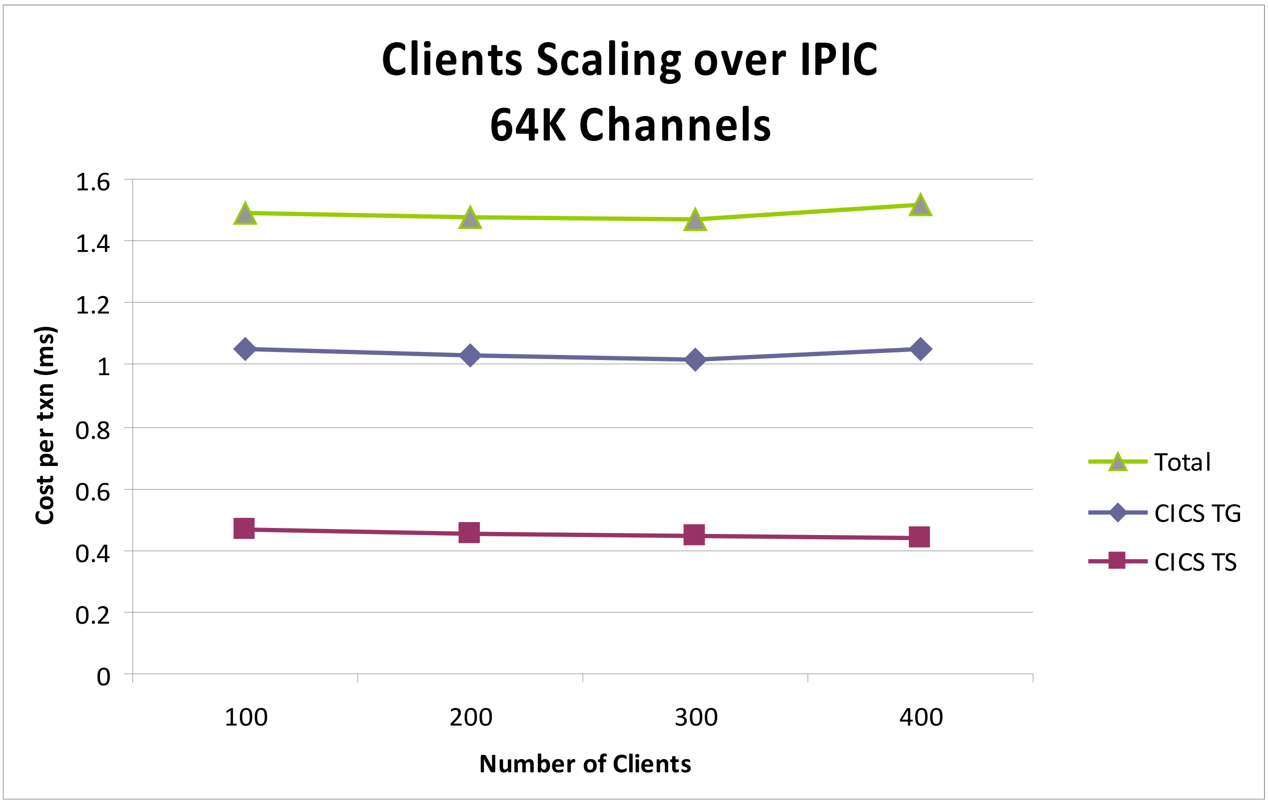

Illustration 5: Workload scaling with IPIC channels

Notes

In this scenario, the CICS TG Gateway daemon address space and CICS TS region are co-located within a z/OS LPAR and connected using IPIC (Fast Local Sockets). The workload consisted of a fixed-size Channel payload of 64KB, whilst the number of client applications increased. Each client was sending requests at a fixed transaction rate. The transaction rate in the Gateway rose linearly in direct proportion to the number of clients.

CPU cost per transaction was measured in both CICS TG and CICS TS address spaces, whilst the number of clients was increased from 100 (244 TPS) to 400 (975 TPS).

Both CICS TG and CICS TS address spaces demonstrate a predictable CPU cost per transaction as workload scaled with a payload > 32KB in size utilizing IPIC connections with a Channel program.

CICS TG V8.1 was used with CICS TS V4.1 in this scenario. No zAAP was active for this scenario.