

## Event builder update

### I) VRB stand-alone benchmarks

Universe I vs. II

Polling vs. interrupt-driven VRB reading

### II) The VRB as part of the event builder

Throughput vs. VME (revisited)

Assignment of VRBs to Scanner CPU crates

### III) Problems resolved

Throughput hysteresis vs. fragment size  $\sigma$

Limit on number of virtual connections

### IV) Plans, conclusions

I

**VRB stand-alone benchmarks**

## Universe I vs. II

The Universe chip drives the VME bus on Motorola PowerPC boards.

Our MVME2600s have version I

Tested a MVME2603 with version II  
Otherwise identical to our 2603s  
Loaned by Arrow Electronics

D64 DMA throughput using VME memory  
I – 31 MB/s  
II – 50 MB/s or 37 MB/s

Get higher rate for II by using "secret" register  
Reduces DTACK\* filtering  
Reduces two other delays  
No transfer errors during 20-hour VIPA test

All new MVME PowerPC boards will have U II

Possible to upgrade older boards (\$380 each)

## VRB reading tests

Wrote VRB object for use by SCPU code

- Uses Universe II in fast mode

- Each instance handles a single VRB

- Uses DMA engine for all access

- No DMA chaining

- No FISION yet

Two reads per event – event size then the rest

VRB set to emulate ten channels (~ 5KB/event)

Throughput with one VRB

- 44 MB/s – always poll for end of DMA

- 36 MB/s – always use interrupts

- 39 MB/s – poll on 1st read, int. on 2nd

Throughput limited by

- Two reads per event

- Smallish event size

- Interrupt latency

Single polled reads of 32K each reach 55 MB/s

## II

### **The VRB as part of the event builder**

## Throughput vs. VME (revisited)

Recall from Feb. review that simultaneous VME and ATM transfers slowed event building.

Old test used Universe I and simulated VRB

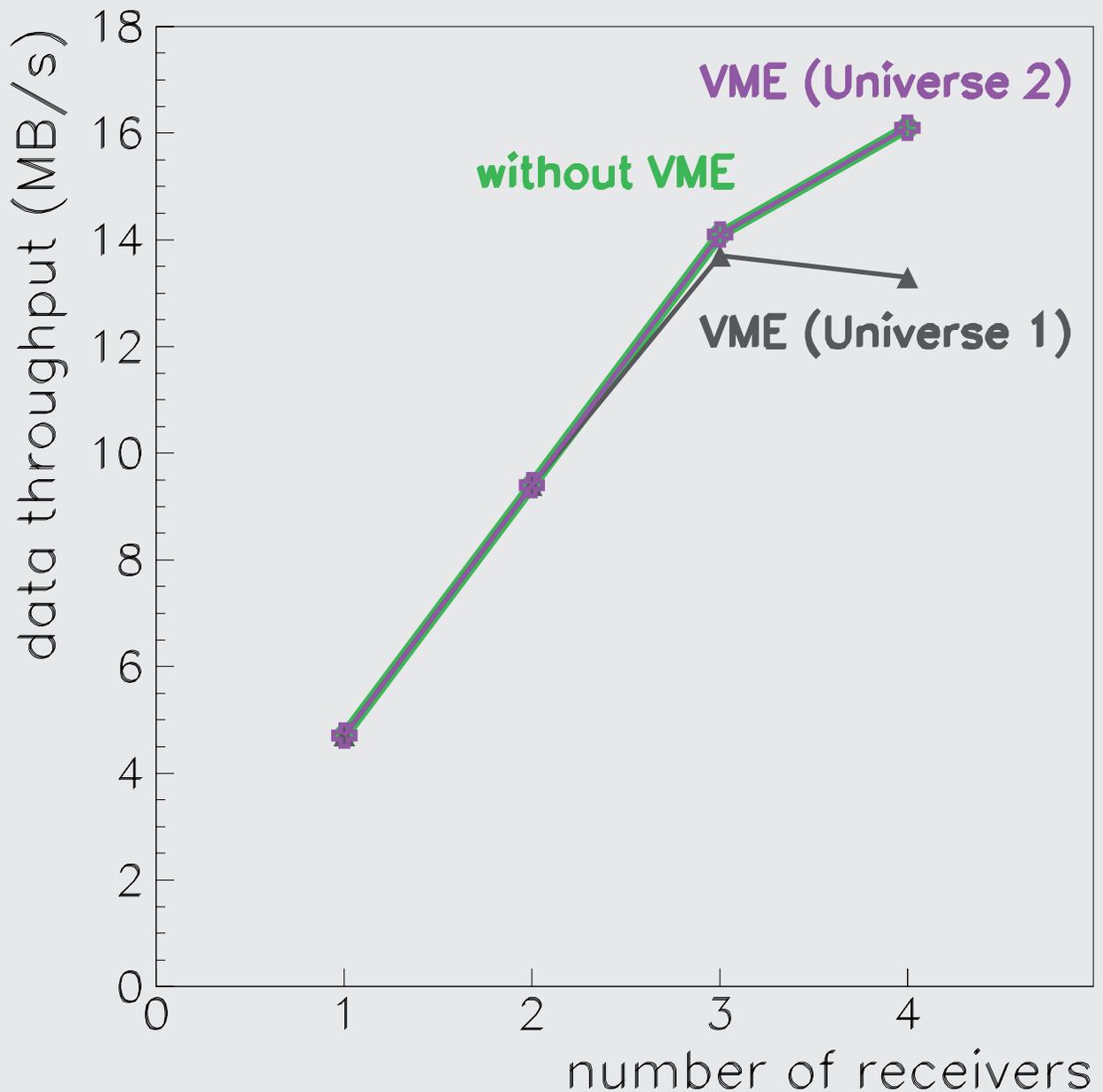
New test uses Universe II and real VRB

1 SCPU+VRB to 1, 2, 3, 4 receivers

Polled version of VME object

VME transfers didn't slow down event building

## One Scanner to N receivers



W/o VME and VME U-II are superimposed

## SCPU crate data sizes & VRBs

Based on Jan 1998 estimates

### Constraints

- SVX has 6 crates (1/2 barrel each)

- ISL has 3 (central, E, W)

- Plug cal. has own crate (partitioning)

- 4 Gbit links per silicon VRB

- Up to 10 TAXI links per non-Si VRB

- Less than 16 KB (mean) per crate

- Split data as evenly as possible among crates

SVX 0-0 not included

- Would add 4 VRBs

## SCPU crate layout

Detector	Size (KB)	SCPU crates	Links/crate	Data/crate (KB)	VRBs/crate	VRBs
SVX	76.10	6	24.0	12.7	6	36
ISL plug	17.31	2	20.0	8.7	5	10
ISL central	10.39	1	24.0	10.4	6	6
COT	25.90	2	12.0	13.0	2	4
Plug Cal	13.40	1	12.0	13.4	2	2
Cen.+wall Cal	3.80	1	24.0	3.8	3	3
Trigger	18.60	2	20.0	9.3	2	4
Other	6.50	1	10.0	6.5	1	1
<b>Total</b>	<b>172.00</b>	<b>16</b>				<b>66</b>

### III

## Problems resolved

## Throughput hysteresis

### Symptoms

When fragment size variation got too large, throughput would nose-dive

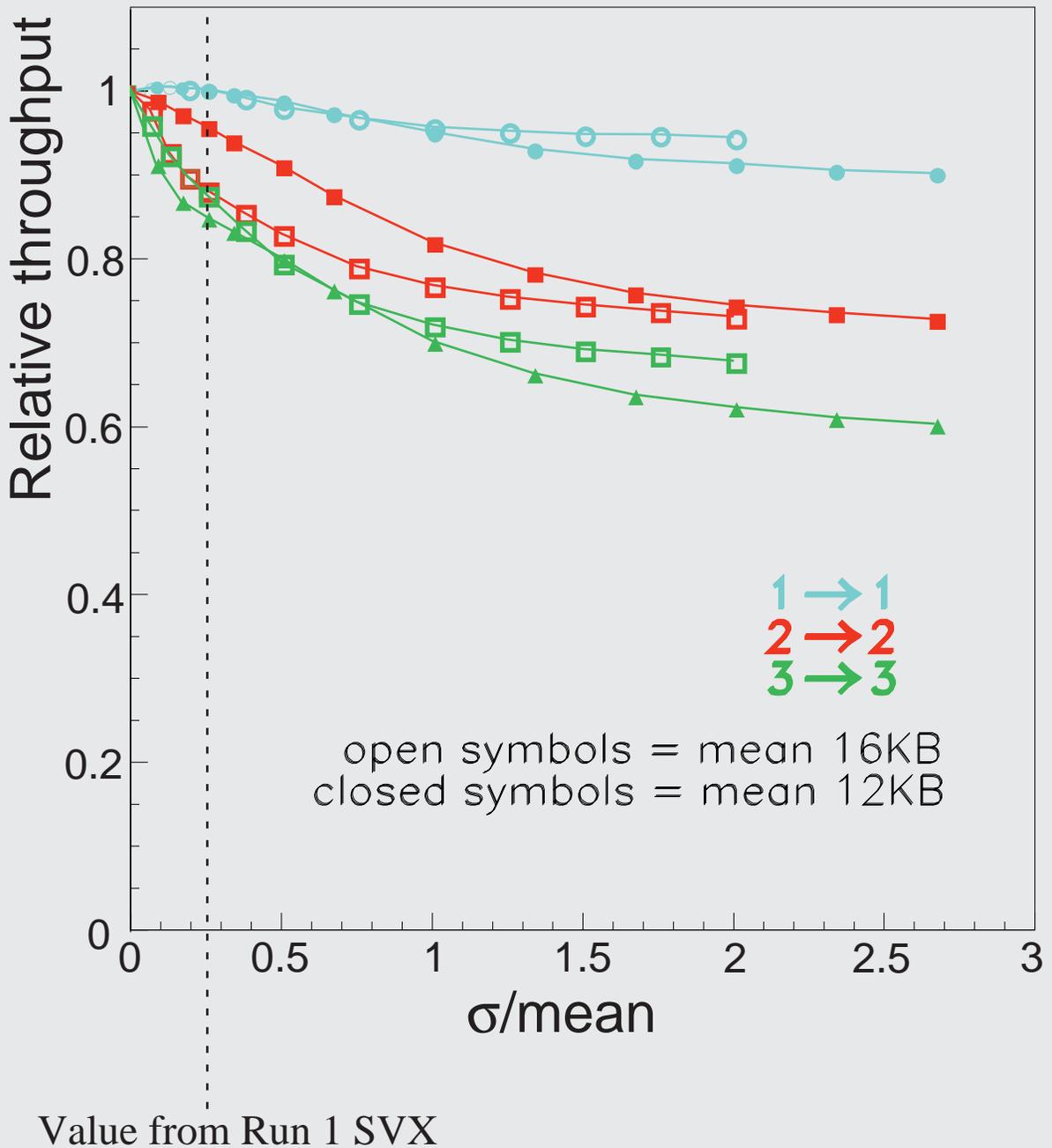
Reducing variation did not restore throughput

### Solution

Fixed bug in ATM-card driver

Some DMA-completion interrupts were being lost when fragments were very small

## Throughput vs. frag size variation



## 4515 virtual circuit limit

### Symptoms

Numbers identifying virtual circuits apparently restricted to the range  $0 \leq n \leq 15$  using VxWorks test-bed

Outside this range we saw occasional packet errors for throughput  $\geq 9$  MB/s

This would restrict event builder size to  $16 \times 16$

### Solution

Tests using ATM reception on a PC showed that packets are transmitted correctly

Statistics from switch and sender card confirm this

Problem is in 4515 reception only

Real event builder won't use 4515 as receiver

## IV

### Conclusions

## Plans

### Upgrading to Universe II

Five more MVME2603 ordered (total 18)

The new boards will have U II

When they arrive, send five out for upgrade

Rotation in groups of five

### ATM card purchase

Interphase 4515 now obsolete

Our driver won't work with newer models

We sent a last-time order for 20 (total 30)

Covers any reasonable EVB expansion

Asking for release from non-disclosure

### L3 PC purchase

Vendor chosen (Comark)

First machine of 24 due week of Sep 21st

We will configure, then send back disk

Comark will clone disk 23 times

## Conclusions

Can get good VME throughput with Universe II  
All new Motorola boards will have it  
We will upgrade our present boards

SCPU's now have software to read VRBs  
VME accesses don't slow ATM

Resolved some technical problems  
VC limit  
Throughput hysteresis vs. fragment size

Expansion of L3 farm in progress

Extra ATM cards ordered