VIA Architecture

The Virtual Interface Architecture

Dave Dunning

Greg Regnier

Intel Server Architecture Lab

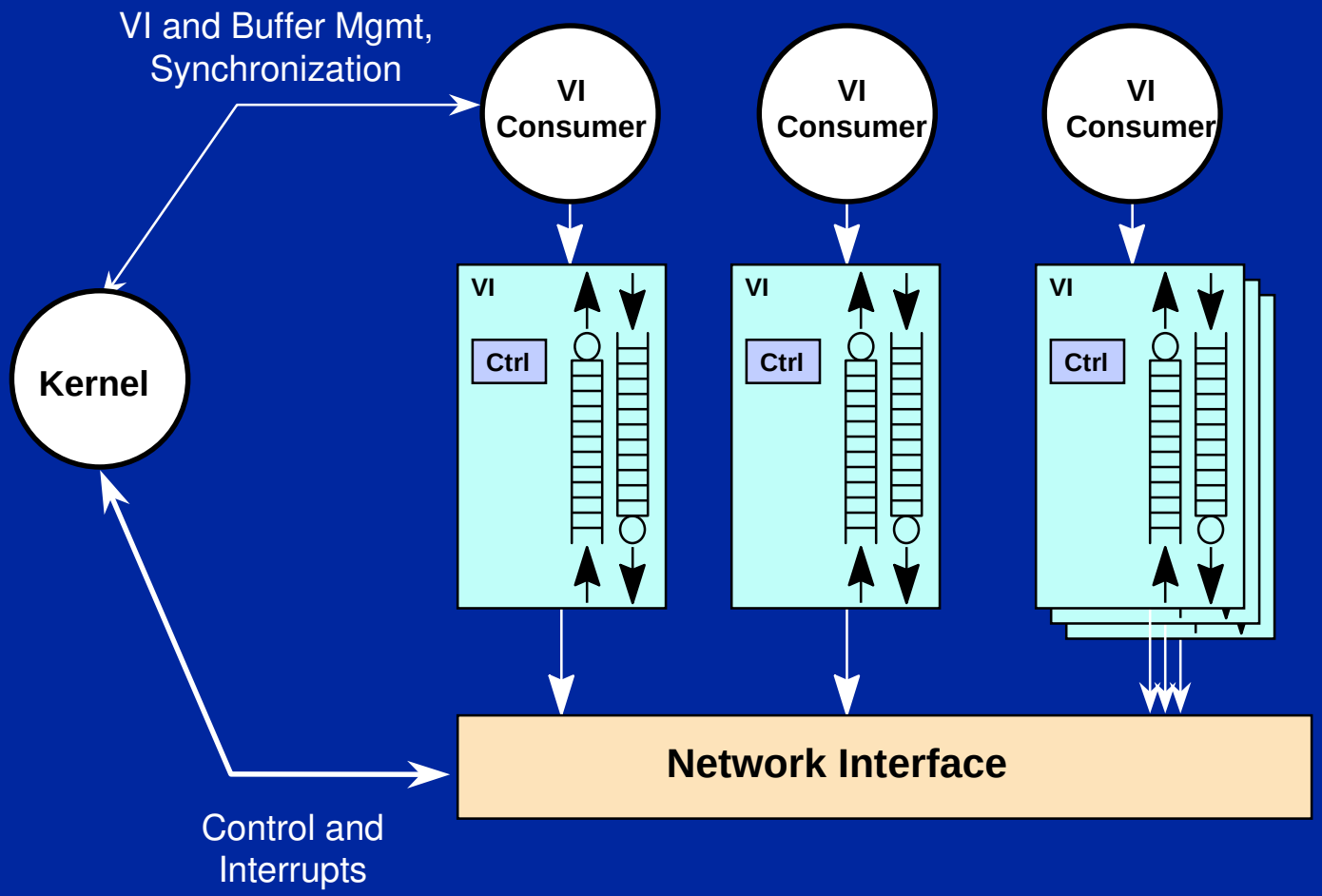
The VI Architecture is:

- An interface to a set of constructs and associated semantics for low-latency message passing.
- Initiative lead by Compaq, Intel and Microsoft

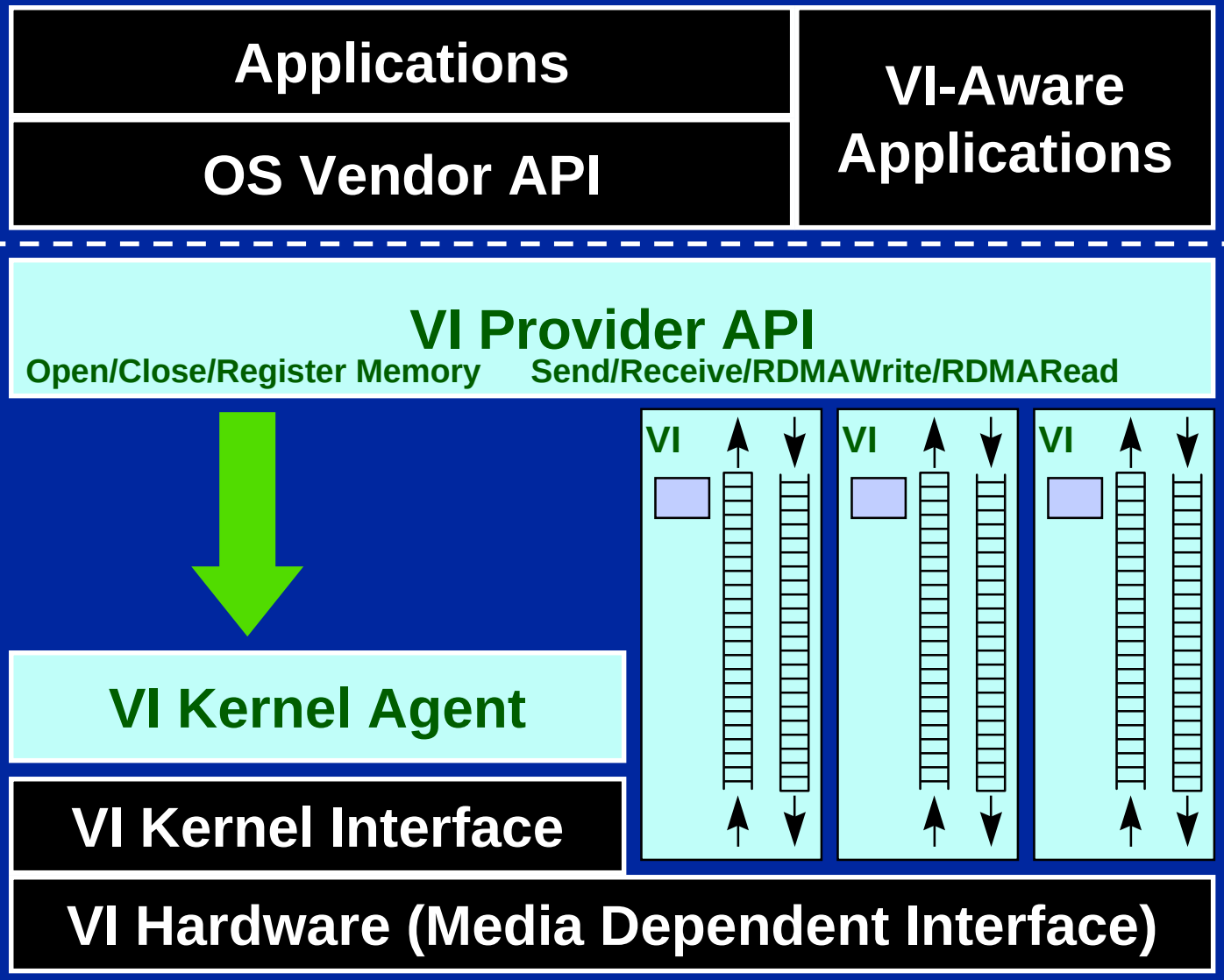
VI Architecture Features

- **Fully protected, direct user-level access to the network interface**
  - connection oriented
- ***Illusion* of a dedicated network I/F**
  - per thread, process, or application
- **Applications transfer data without OS assistance**
  - zero copy

VI Architecture Description



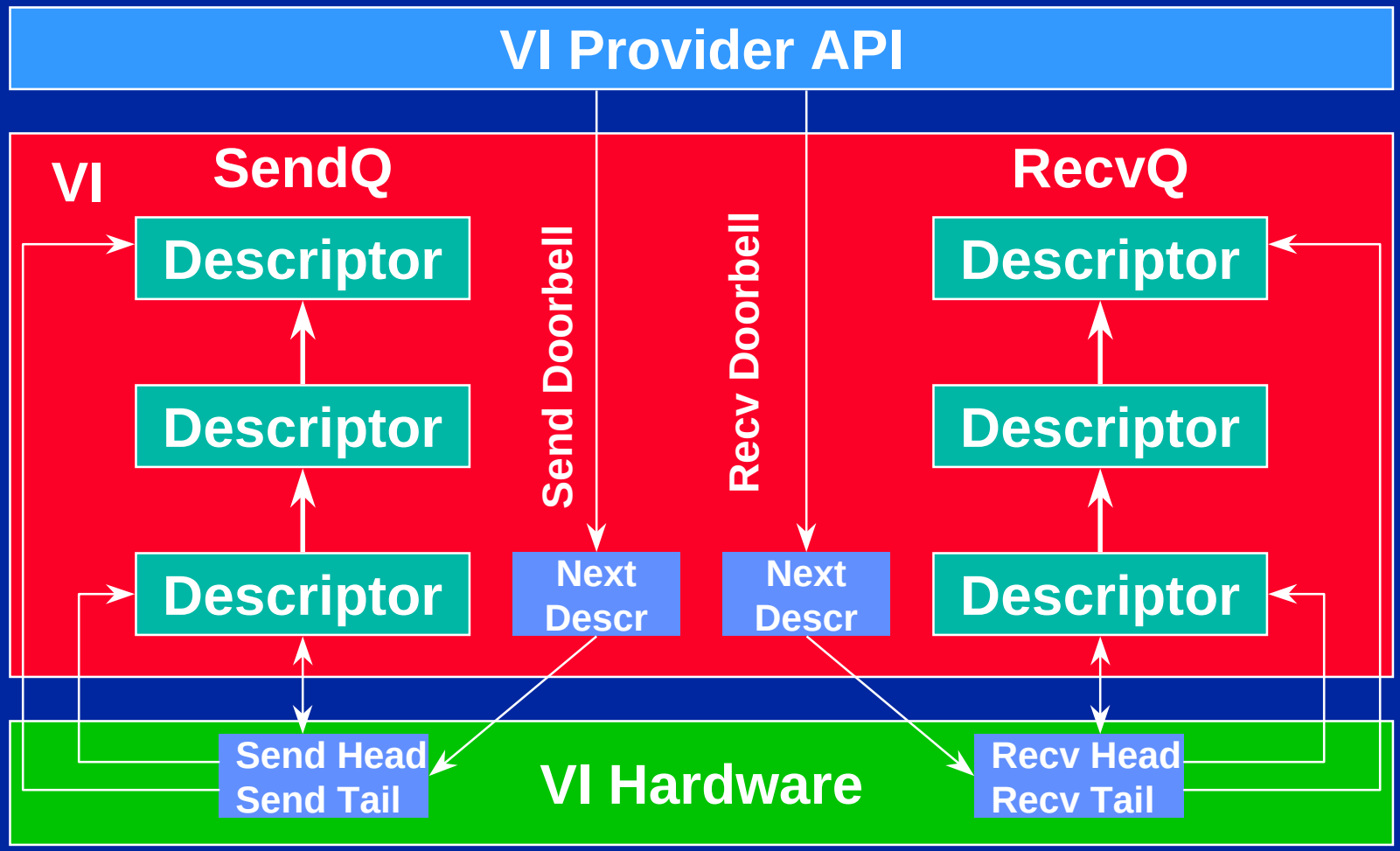
The Communication Stack



A VI Consists of ...

- **Work queues**
  - one for send, one for receive
  - each are linked lists of packet descriptors
    - one descriptor = variable length scatter/gather list
    - one descriptor = one VI packet
- **VI Control**
  - notification work has been queued (doorbell)
  - notification work has completed (status and interrupt)

VI Work Queues



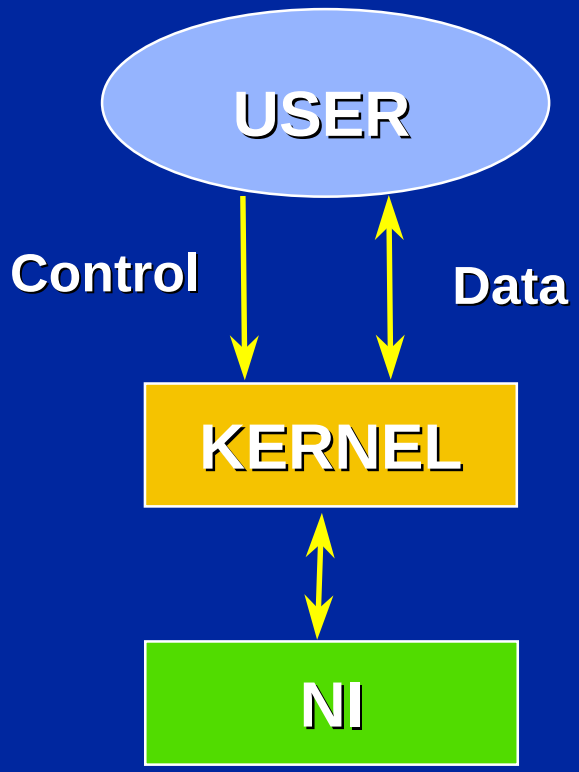
VIPL API Overview

- **Resource management**
  - host buffers, endpoints, connections
- **Send, Receive and RDMA**
  - asynchronous ‘posting’ of work
- **Synchronization**
  - poll and wait for completed data transfers
- **Error handling**
  - notification of exceptional conditions

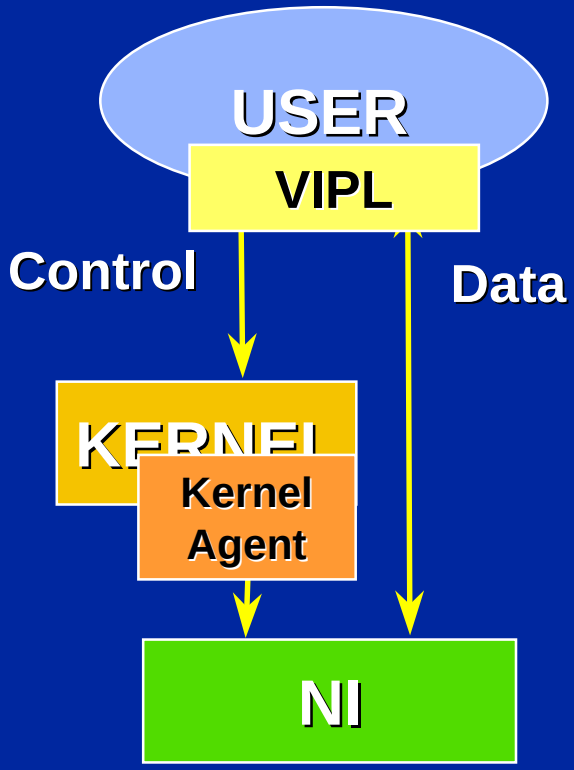
VI Benefits

- **Zero-copy data transfers**
- **Context switches minimized**
  - direct initiation of send/receive/RDMA
- **Interrupts Minimized**
  - interrupt only on wait-for-completion
  - fewer interrupts under heavy load
- **Portable API**
  - multiple network implementations

VI Benefits



Traditional



Zero Copy

To Get More Information

- **Specification Information**
  - wire@co.intel.com
  - note: the spec is under NDA
- **A copy of the slides**
  - victoria_j_frazier@ccm.co.intel.com

Questions?