ILC *Reasons for wanting the data*

- Routine (long-term) data storage and archiving
  - Statistical values from each pulse from each station (eg 400x 24-bit vectors / RF station)
  - Statistical waveforms from each pulse for each linac (eg avg of all cavity probes) (eg 400x 10K waveforms per linac)

- Triggered events, eg beam loss post mortem, “digital scope” measurements, etc
  - All data potentially useful
  - Local storage buffers for all data from last N pulses.
  - Process/analysis quickly [locally or globally??]
  - Archive only a limited subset of data

- Preemptive problem prediction
  - All data potentially useful
  - Process/analysis data in real time
  - Archive only trends and processed information.

- Important premise:
  - Each 200ms pulse is a unique experiment/event and is self-contained, therefore…
  - All data collection, processing, and archiving must be completed within the 200ms time window.

Carwardine's initial assumptions (one RF station)

- Default rate of stored waveforms (twice the bunch rate):
  - 6MHz, 16bits per signal x2 (I+Q)
- Duration of stored waveform:
  - 1.6ms (ie 10K samples per pulse)
- Number of channels per RF station (3 cryomodules) is 102, made up of:
  - BPMs: 3
  - Beam pickups: 3
  - Cavity probes: 24
  - Forward power: 24
  - Reflected power: 24
- Total data available per pulse:
  - 102 x 2bytes x2 x10K samples = 4MBytes

ILC Outcome of discussion

- All we need for beam physics:
  - Vector sum over 24 cavities (one per station): 300ns sampling over 1ms, 32bits
  - Beam position info: x & y, 300ns over 1ms, 32bits
  - Total: 24K x 670 stations per pulse: 15MBytes/pulse: 80Mbytes/sec

- Final storage:
  - Add fudge factor of 2 or so to get to total required for engineering and physics, giving final data stream to archiver of ~200MB/sec

- Scalar values:
  - Assume we need no more than 1000 values per RF station per pulse.

- See next slide for block diagram and data rates…