Hardware Components

Even when split into multiple stages, computation for a particular stage may exceed the capabilities of a programmable device. In this case, the processing stage may be implemented in hardware. Therefore, the communication infrastructure must support communication to/from hardware devices.

Trend to finer-grained processing and communication

Several factors are influencing a trend to finer-grained processing and communication. One factor is the complexity, change, and customization options of the emerging standards. This requires great flexibility in the implementation, which in turn favors an approach which decomposes the problem into many parts, with the option of quickly changing the implementation of the parts. It seems that a natural fallout of this finer-grained decomposition is the requirement for finer-grained communication sizes and rates.

For example: a processor sends order 100 bytes to a hardware block for processing that takes order 100 cycles.

However, many different variants and approaches are in active investigation, the optimal strategy is not clear.

Streamed Processing

In the multi-stage configuration, a dataflow or streaming style of computation may be more appropriate. Depending on the granularity of the decomposition, the “tokens” exchanged between stages may be large (e.g., video frames), down to individual data values.

Multiple Flows

In many cases, multiple flows must be supported. For example, one or more audio streams, the main video stream, picture-in-picture streams, etc.

Dynamic Operation

Multimedia devices are increasingly dynamic. This includes many operating modes (voice calls, digital still camera, video reception and transmission, audio playback and record, etc). Arbitrary subsets of these operating modes may be selected for simultaneous operation by the user at fairly fine time-scales (e.g., in the order of seconds). Within a mode, operation may be dynamic at even finer time scales. For example, packets from a wireless connection may arrive in bursts.

Non-deterministic communication rates

In many cases, the amount of data consumed and produced by a processing stage may not be deterministic, resulting in variable communication rates.

Low Power Operation

Power is a central concern for mobile devices. Components must be switched off or moved to lower voltage/operating frequency depending on system load. Computation occasionally must be redistributed over the available resources in order to optimize power consumption.