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DPE Requirements
Connectivity Platforms

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Performance

- **The 1st question product developers ask**
  - true of yesterday's centralised switches
  - less true now that connectivity products are more distributed
  - targets are still very demanding (when articulated)
    - round trip RPC time
    - oneway throughput measures
- **COTS platforms versus Bespoke platforms**
  - COTS implies general solutions, little optimisation
  - Bespoke implies very high cost of ownership / deployment
- **Transparencies cost in terms of performance**
- **Protocol features cost in terms of performance**

Design-time Decisions

- **Closed system assumption**
  - there is a design authority that spans the system
  - International standards span what are in other respects separate developments
- **Interfaces are typed statically**
  - interface types known at design time
  - no need for DII
  - minimal, cheap run-time type checking
- **Real-time Analysis & Design**
  - e.g. ObjecTime … a UML profile one day !
- **Co-operating FSMs are a very common pattern**

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Concurrency / Asynchrony

- **N nodes give concurrency for non-blocking invocations**
- **Threads retain concurrency in face of synchronous invocations: one thread blocks another runs**
  - general purpose solution
  - expensive: stacks, context switches (less so than processes)
- **Deferred Synchronous (e.g. CORBA "Poller" model)**
  - application has to manage execution context whilst deferred
- **Asynchronous (e.g. CORBA "ReplyHandler" model)**
  - too much !? just want server to "know" client
- **Synchronisation semantics for oneway operations**
  - locally, with transport, with server, with target (i.e. synchronised)

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Predictability (Real-time)

- **Real-time requirements**
  - throughput based, response times are qualified by percentages
  - priority inversion isn't evil … but must still be watched
- **Predictability costs in terms of performance**
  - schedulable: all activities meet their deadlines all the time
  - statistical predictability: stochastic arrivals and queuing theory
- **Schedule node by node (no global priority propagation)**
- **Managing the allocation / use of Resources**
  - Resources are of 3 kinds: processing, storing, communicating
  - Management has 3 facets: partitioning, sharing, arbitrating
  - e.g. Connection Brokers and "diffserv" Bandwidth Brokers

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Availability (Fault tolerance)

- **"7 x 24" Availability required of the System**
- **Client-side transparency**
  - application doesn't know its talking to a group
  - retry upon failure is transparent
- **Group member liveness**
  - aggregated at various levels: Object, Servant, POA, Process, Node
  - heartbeat messages
- **Group member state synchronisation**
  - hooks for journalling (very much specific to each application)
- **Gateways to active replication regions (proprietary)**
  - reliable multicast protocol with total ordering

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Services

- **Naming / Trading**
  - bootstrapping: broadcast rather than configure initial services
    - CORBA standard doesn't meet these needs
  - a Trading client only: possible uses of trader are too specialised
- **Events**
  - high throughput
  - asynchronous model
  - CORBA events / notifications don't cut it
    - truly asynchronous events from CORBA Component Model !?
- **Transactions**
  - maybe, just maybe, look at relaxing ACID properties

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Outstanding Issues and Non-Issues

- **Protocol Non-Issues**
  - ATM AAL5
  - Interoperability !?
  - Interworking, e.g. with SS7
  - no requirements for Pluggable Protocols
- **Portable Interceptors Non-Issue**
  - will they ever get adopted !?
- **Versioning Issue**
  - in-service upgrades, incremental upgrades
- **Security Issue**
  - efficiency, denial of service (denial of QoS), lawful interception

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Conclusions

- **profile CORBA … Minimum CORBA fits the bill**
  - some of the omitted POA policy combinations thwart optimisations
  - Objects by Value: no place in Connectivity Platforms
- **need part of CORBA Messaging**
  - the deferred sync API (Poller)
  - try to find a subset of the async API (ReplyHandler)
  - policy framework, Synchronosation policy, RoundtripTimeout policy
  - no requirement for TII (Time Independent Invocation)
- **Real-time CORBA**
- **a UML profile (hopefully)**
  - to capture the all important design-time elements

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