Active Networks

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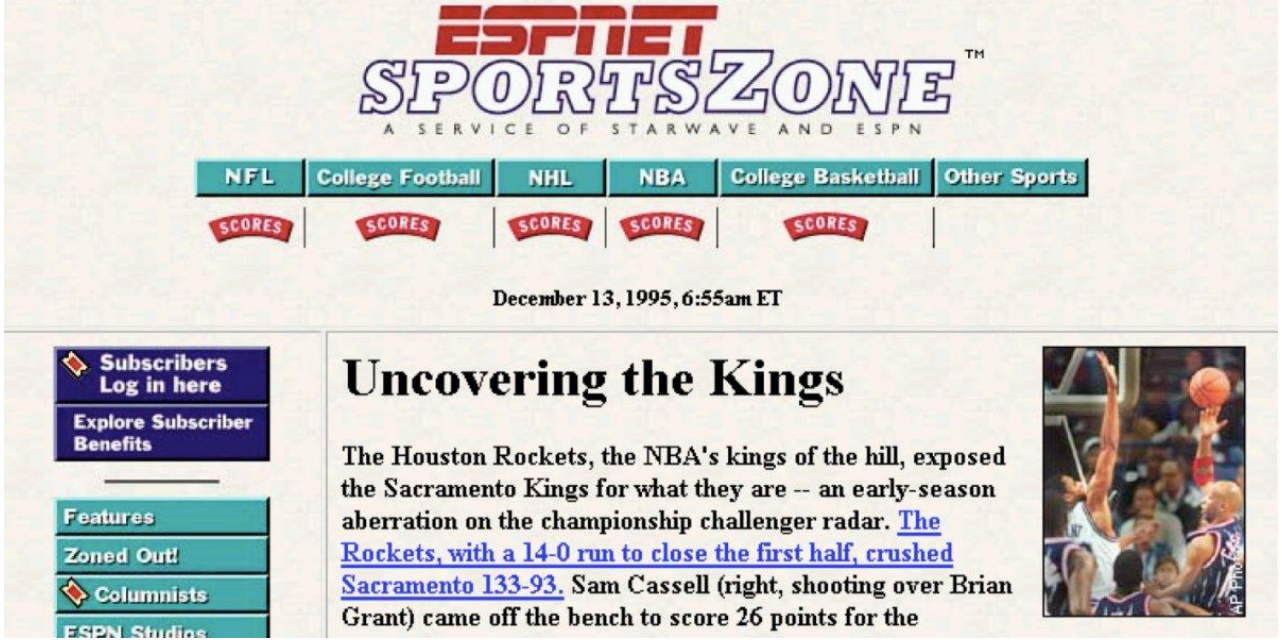
Historical Context



	1996	2014
Users	16M	2.8B
Load time	30S	4S
Unique host	28K	1.1 T
Mobile devices	0	1.75B
Traffic/month(PB)	1.9	29K

Why do we need it?

1. Increase the pace of innovation

2. Already being done, better to standardize

3. Remove the dependence on hardware manufacturers to control the network nodes

Basic concepts

Discrete

- Switches are able to inspect packet content and run a pre-determined set of functions
- Normal packets cannot augment switch function, but router operators may have “back door” access

Integrated

- Nodes in the network provide an instruction set and every message (capsule) is a command
- Switches must be able to provide additional information and possible active storage in order to useful work to be done
- Capsules can inject new program and functionality into nodes along its path and/or access active storage on those nodes

Capsule Programs

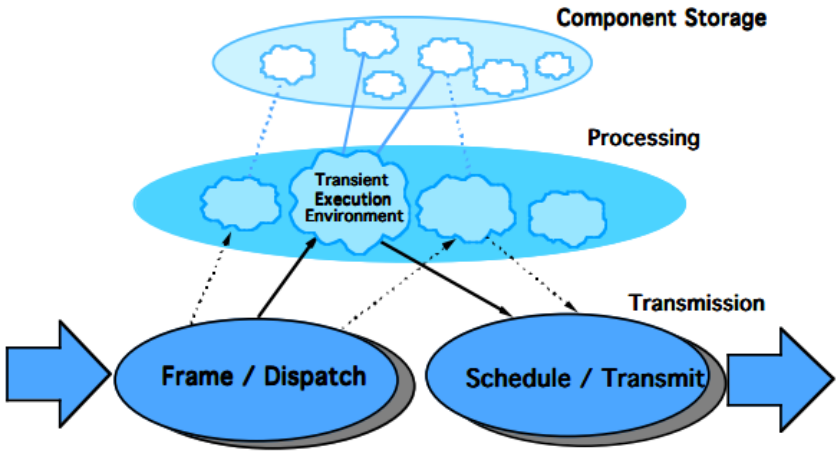
1. Mobility
    - programs can execute on a range of platforms
2. Safety
    - certain resources are protected from capsules
3. Efficiency
    - programs do not compromise existing performance

Node Architecture

1. Hardware can be very different

2. Scarce resources such as storage, bandwidth, and CPU time

3. Fairness between programs



End to end argument

Does active networks follow the E2E argument?

“we note that the argument pertains to the placement of functionality – it does not suggest that the choice of functions that are appropriately located within the network cannot be application-specific.”

Is today so different?

1. NATS
2. Firewall
3. VPN
4. SDN

“The long term trend has actually been towards increased computation within the network.”

Other concerns

1. Cost

2. Privacy

3. Too many standards...Java forever?