Internet Data Center Networks: key to flexibility and rapid application deployment

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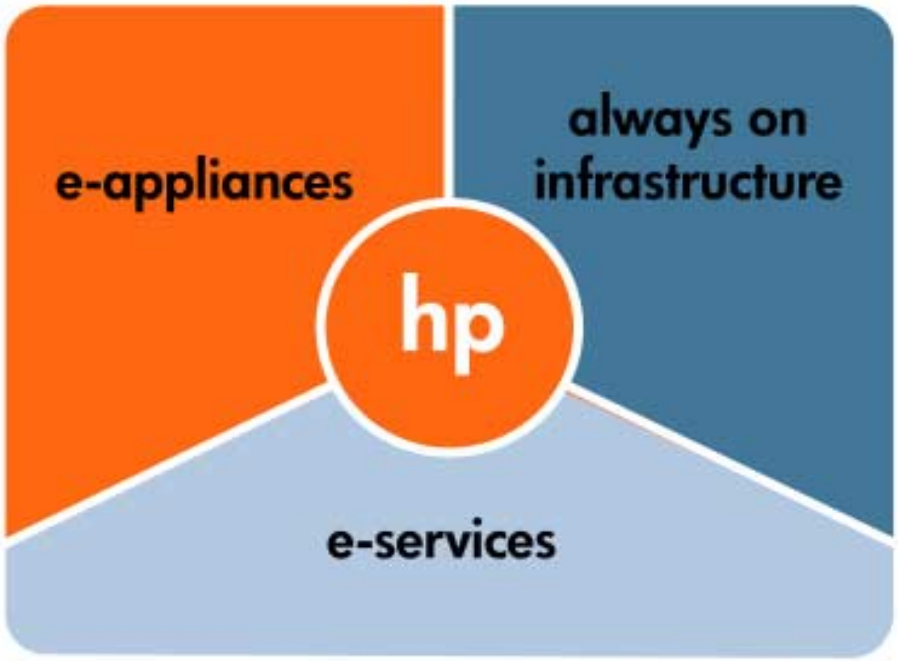
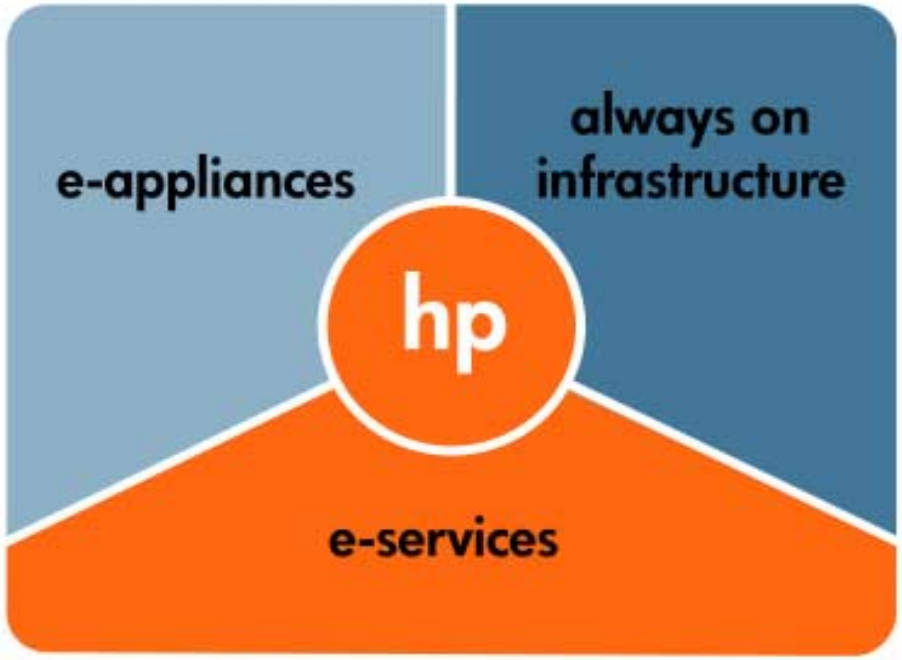


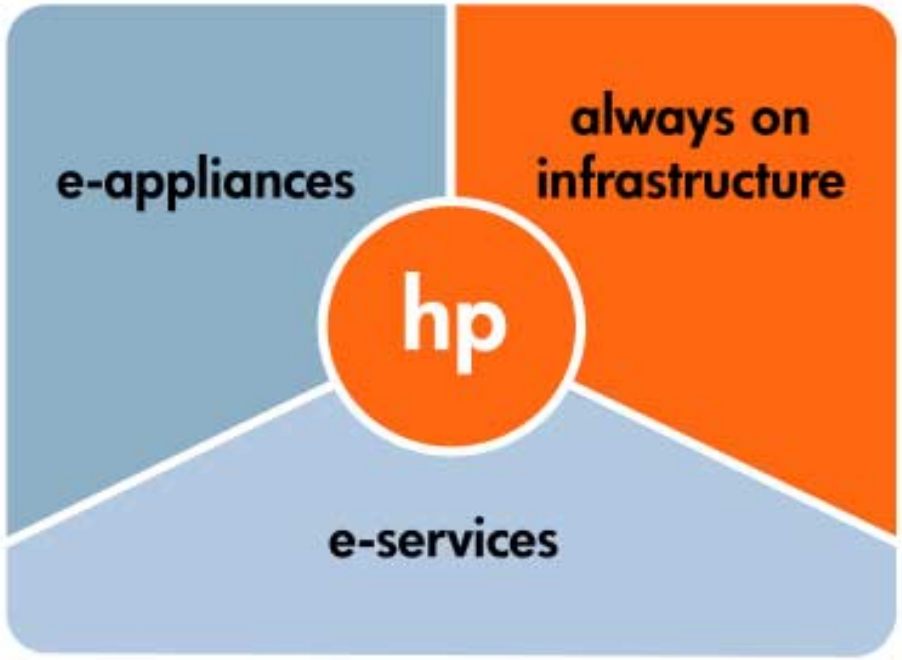
e-appliances

- today they are PCs, PDAs, cellular phones and pagers
- tomorrow they are anything and everything that can hold a small and increasingly much smaller microchip



e-services

- any asset that can be turned into a service for delivery over the net to drive profit, create revenue or generate efficiency

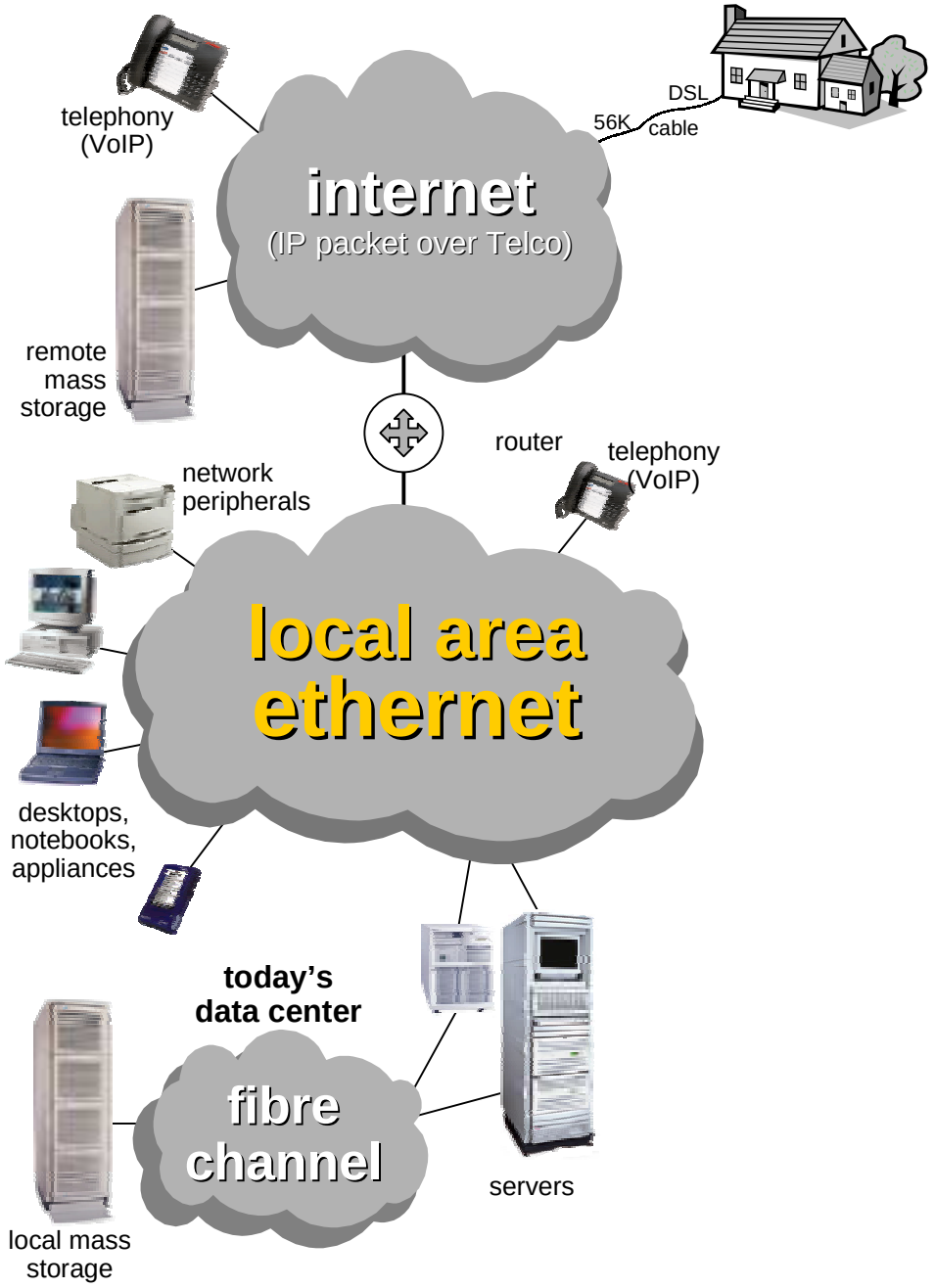


always on infrastructure

- necessary to support millions and millions of transactions and appliances
- ushering in the new age internet data center

e² ethernet everywhere

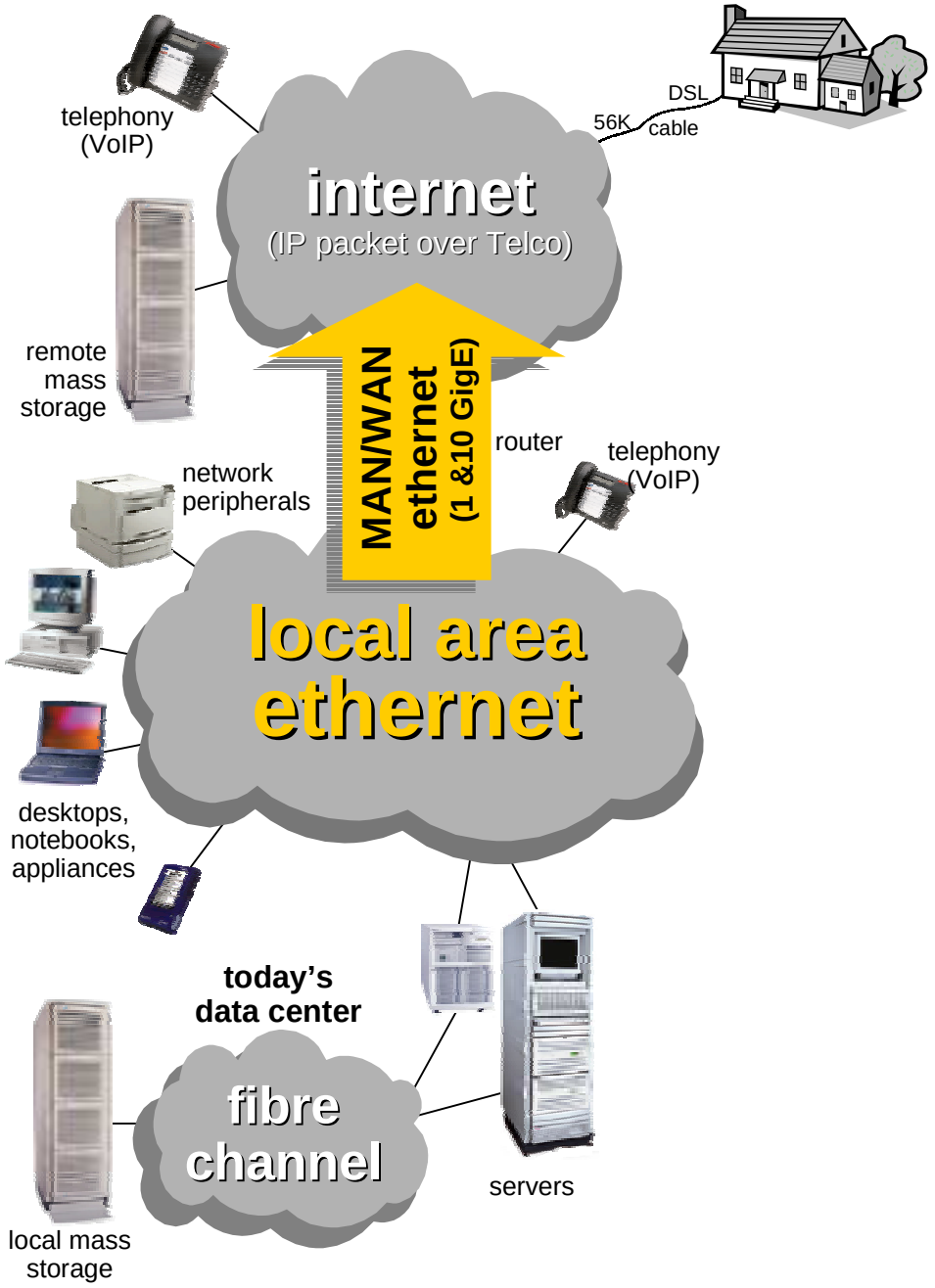
- *1990's:* the dominant LAN
- *late 1990's:* switched LAN
  - no protocol related distance limits
  - 10/100/1000Mbps + 10 Gig in 2002
- *today:* virtually all traffic begins and/or ends as an Ethernet frame with an IP header
- *today:* ethernet LANs connect to WANs with routers
- *today:* key innovations enable the impossible: ***eliminate the WAN and build a global LAN …***

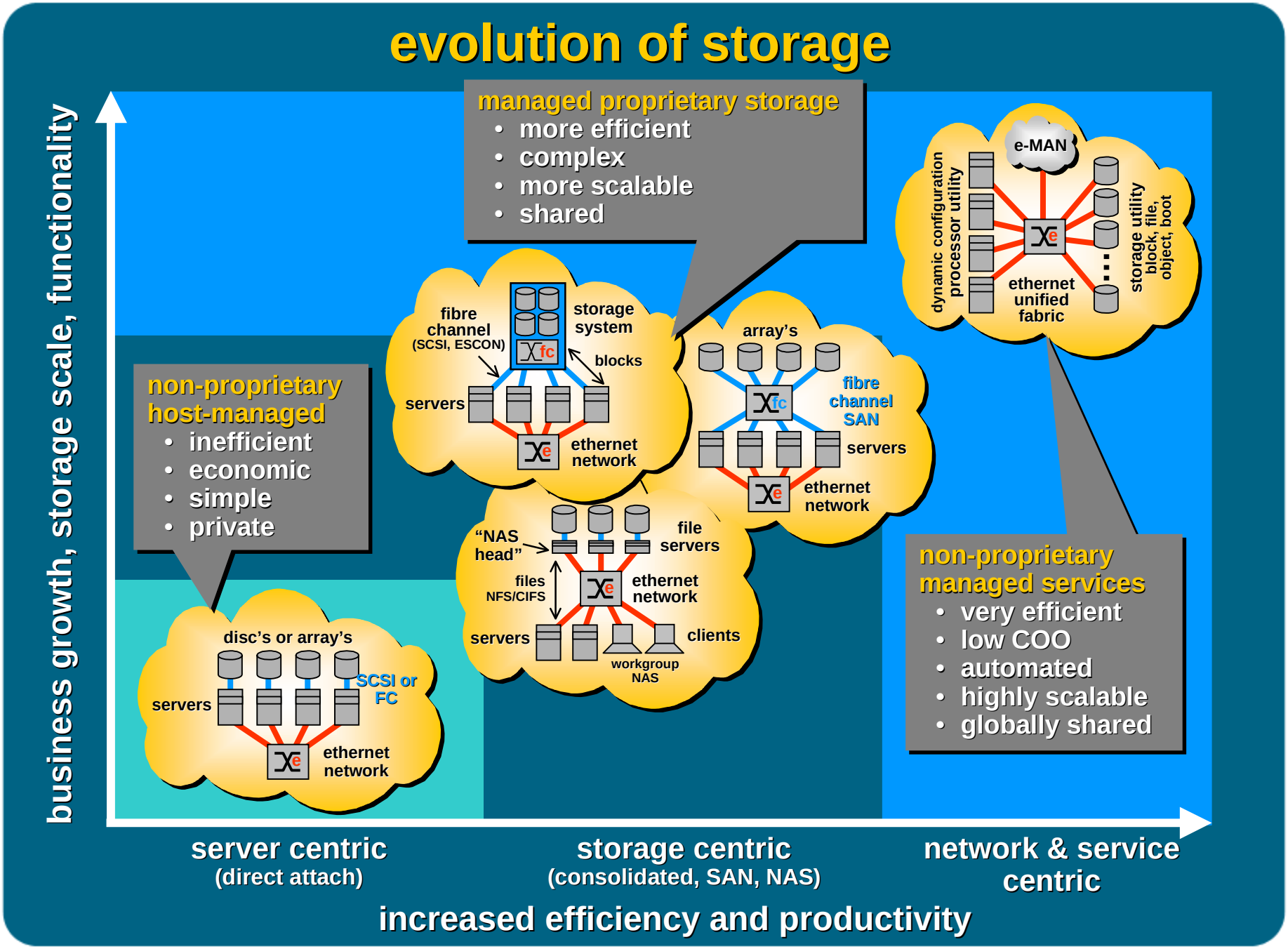


e^2
ethernet everywhere

gigabit ethernet **is already being deployed in MAN's by new service providers such as Yipes and Telseon**

the price is about $1000 per 100 Mbps of bandwidth per month -- about *200 times the price/performance* of conventional T1/E1 lines !!

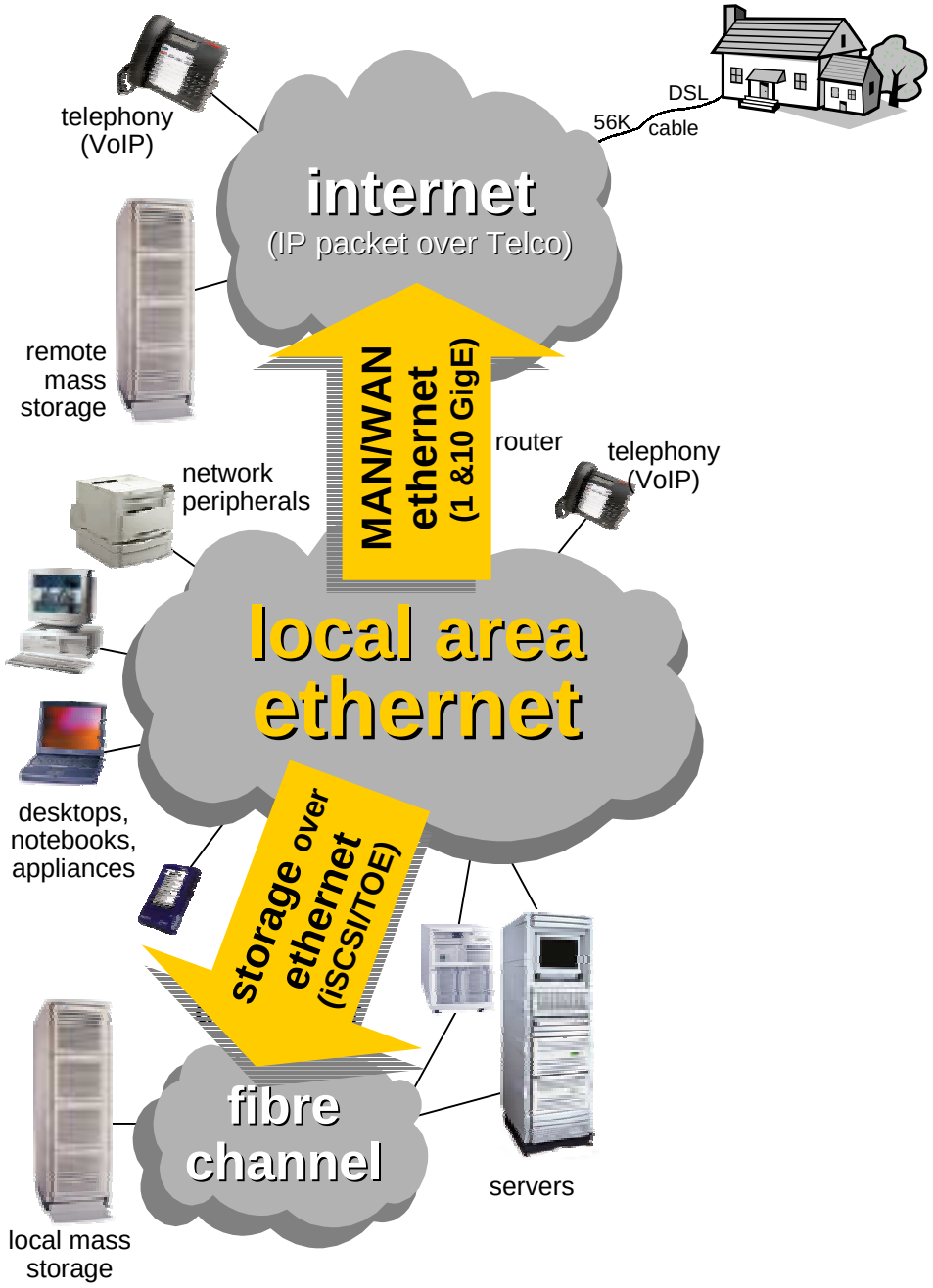




e² ethernet everywhere

the IETF is already well along in creating a new standard called iSCSI that will catapult ethernet forward as a networking technology for all types of storage

we call it SoE or Storage over Ethernet



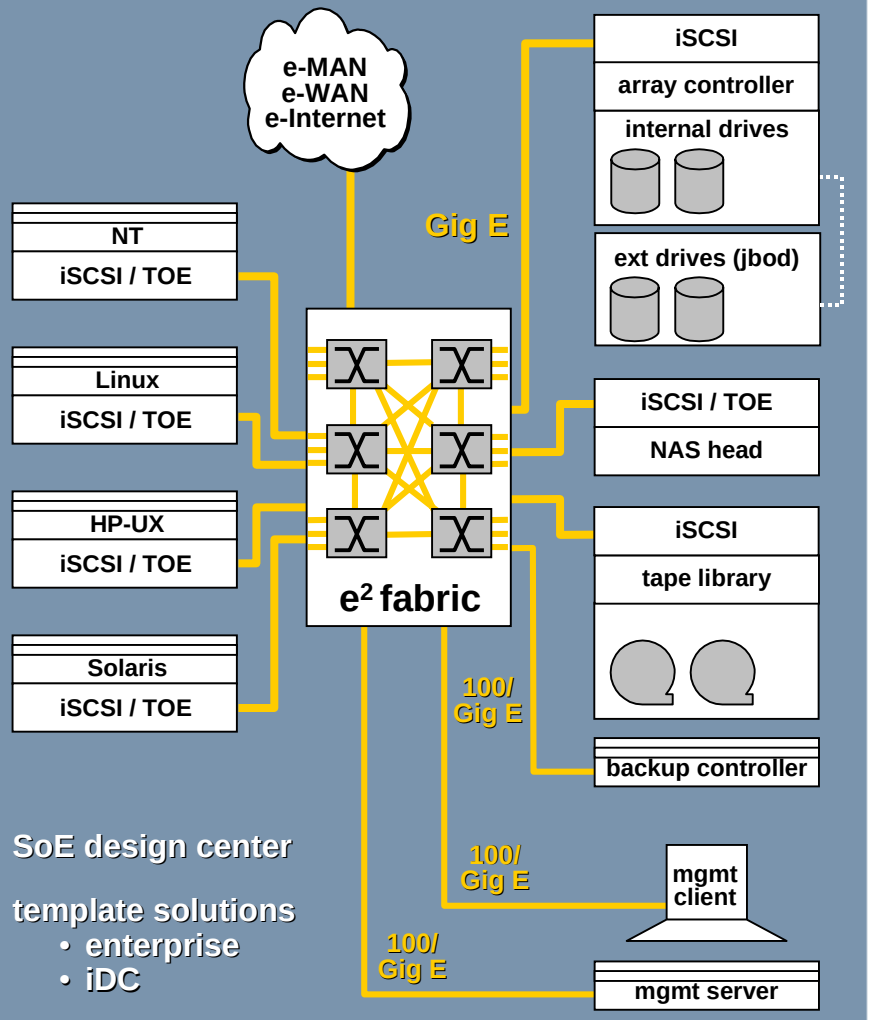
SoE makes storage simple

- ***storage*** that's plug-and-play the ***ethernet*** way … ***easy***
- ***storage*** that's linked with one intelligent ***ethernet*** fabric … ***expandable***
- ***storage*** that extends and grows with ***ethernet*** … ***everywhere***

e-storage

easy, expandable, everywhere, ethernet

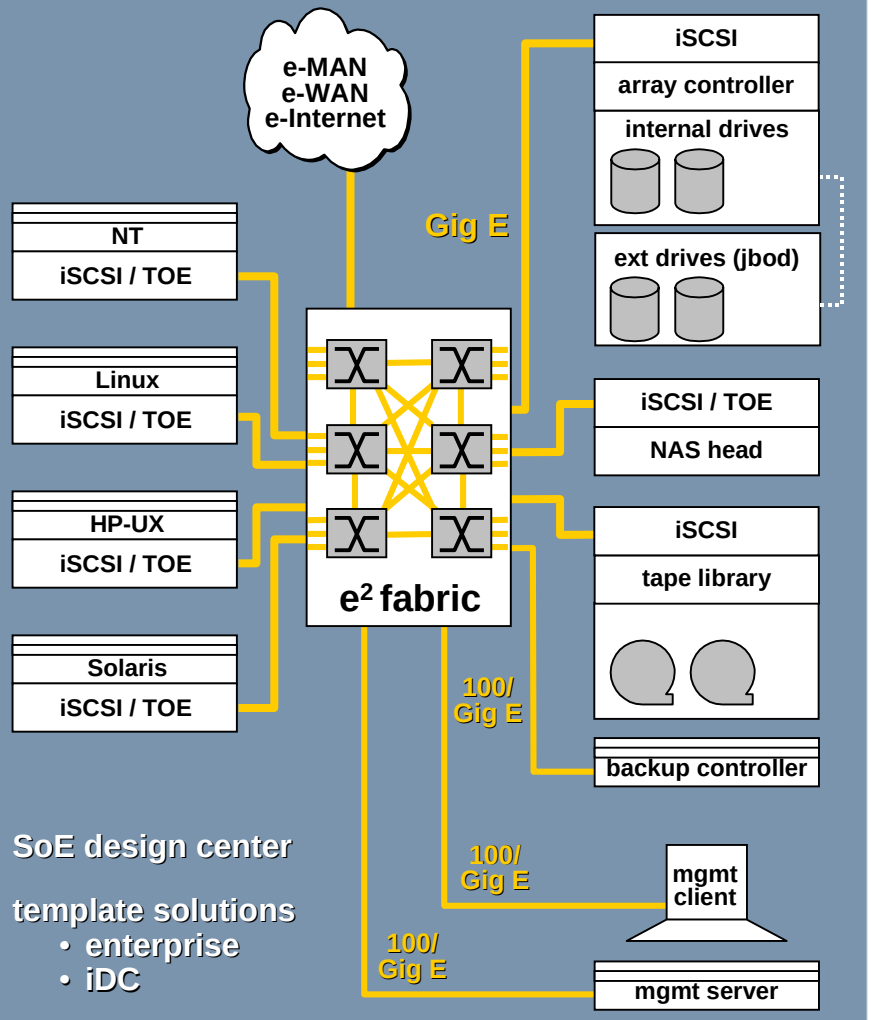
SoE solution framework



storage: networking's killer app

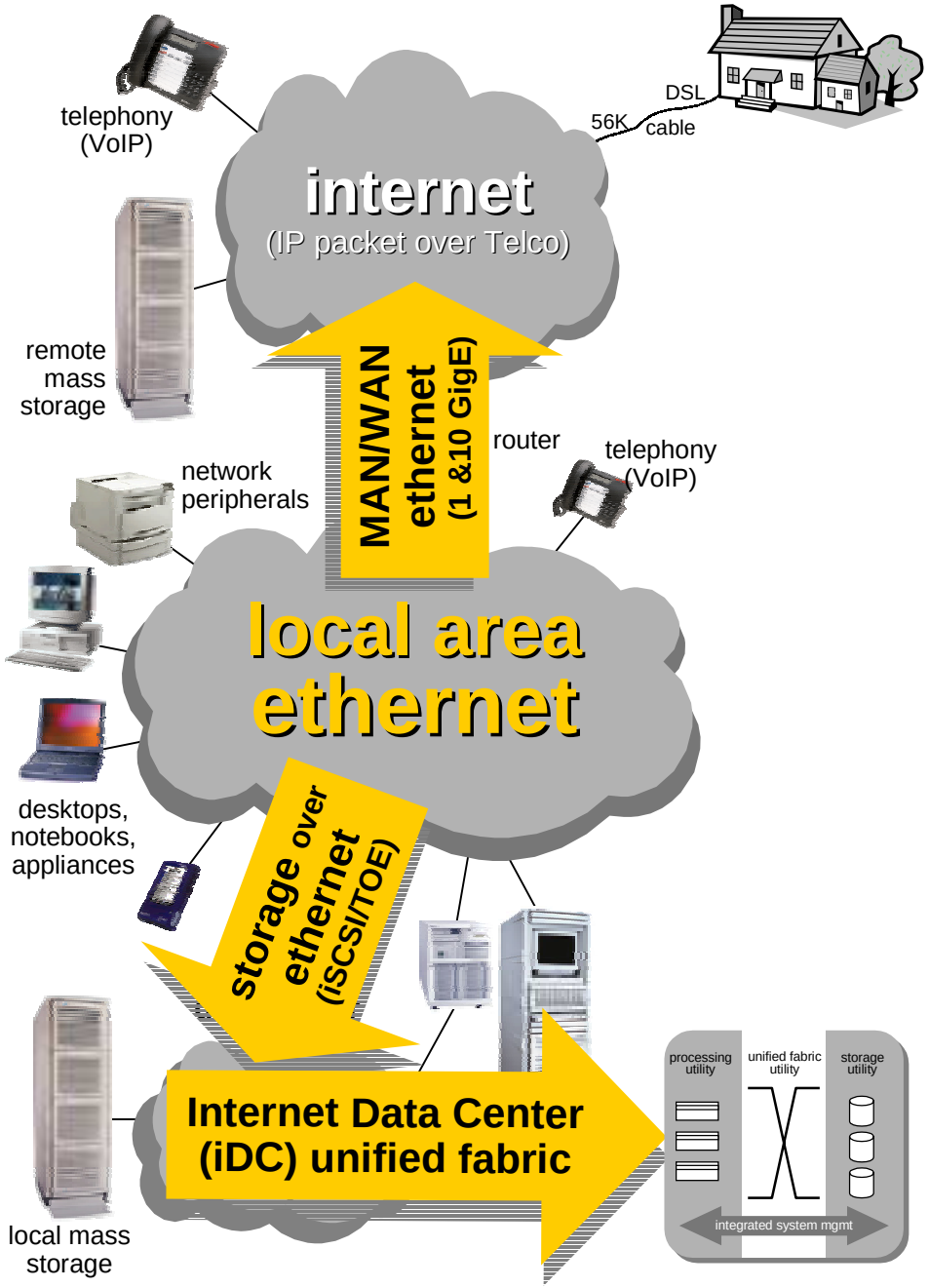
- high bandwidth requirements (10 gigE)
- scalability is key in with rapidly expanding storage requirements
- quality of service with low latency
- high availability / transparency
- load balancing / adaptive provisioning

SoE solution framework



e² ethernet everywhere

SoE will enable a unified switching fabric that will combine processing pools and storage pools with a single network technology -- *ethernet*



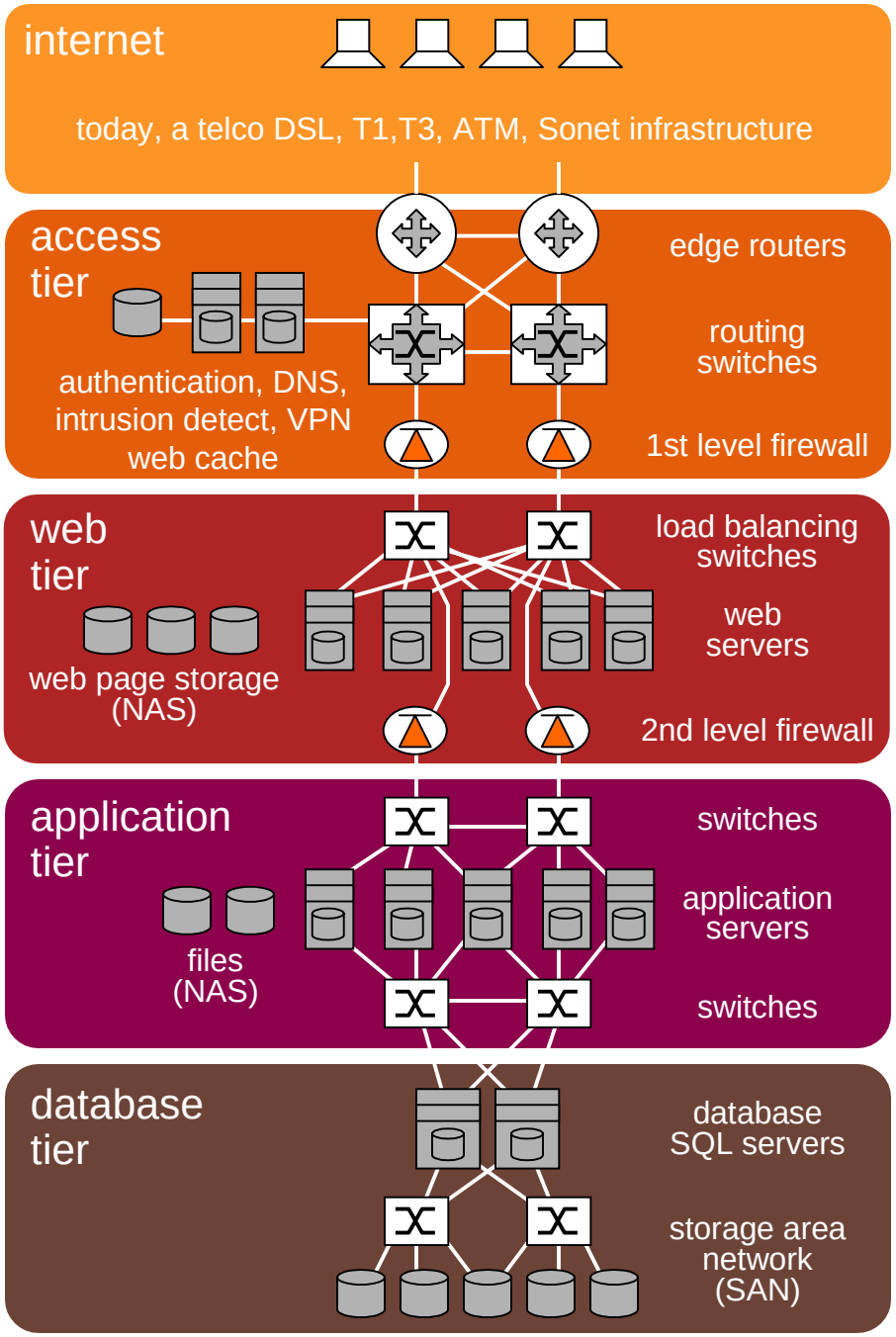
new age internet data center - iDC

displacing old-world computing models with utility computing models

- a new system for the internet age
- unprecedented flexibility, scalability & availability
- always-on infrastructure for trillions of e-service transactions

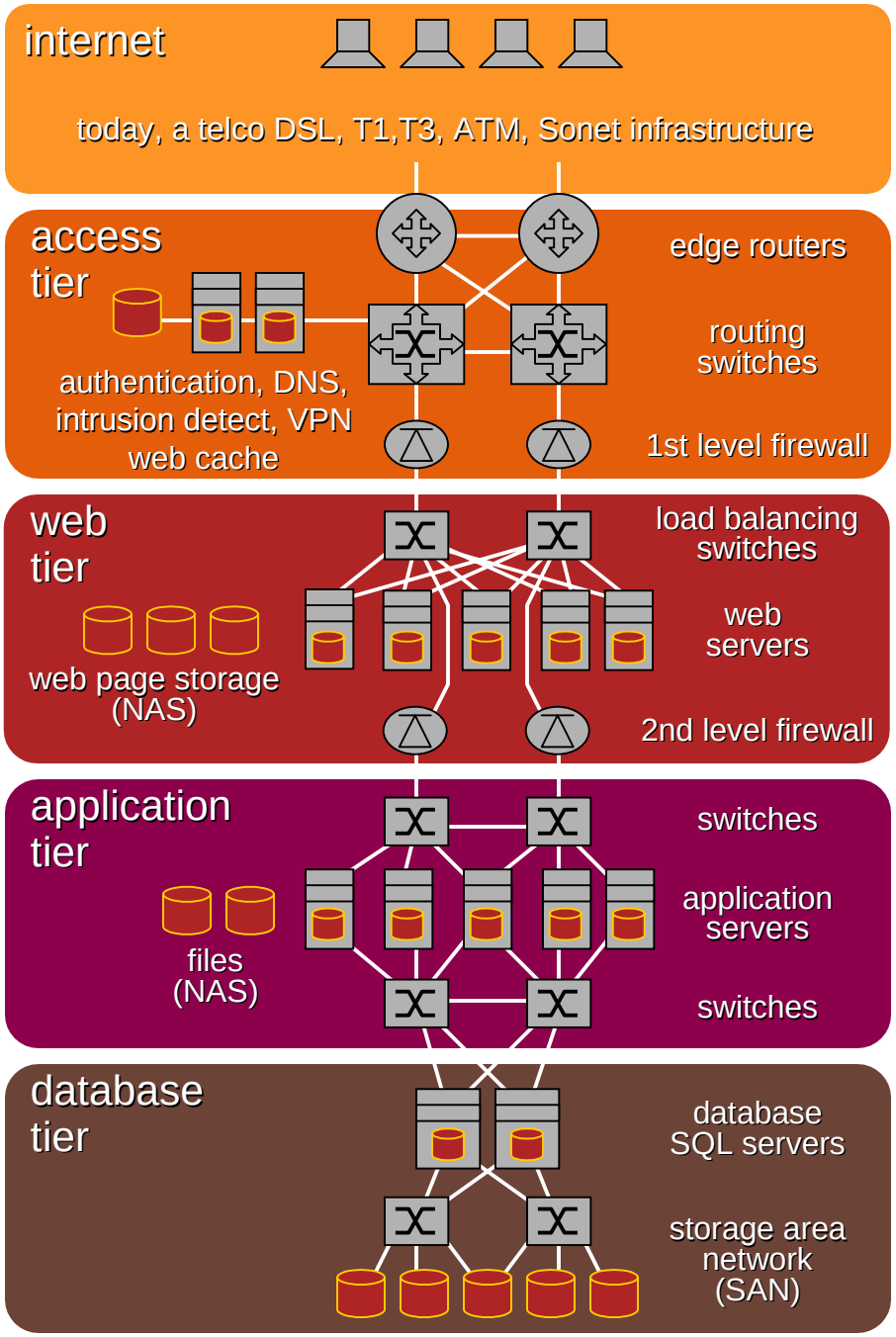
today's internet data center

- four tiers
- customize bottom 3
- implement many times
  - per customer
  - per service
- *unmet needs*
  - *rapid deployment*
  - *rapid reconfiguration*
  - *rapid adjustment to load*
  - *always-on*



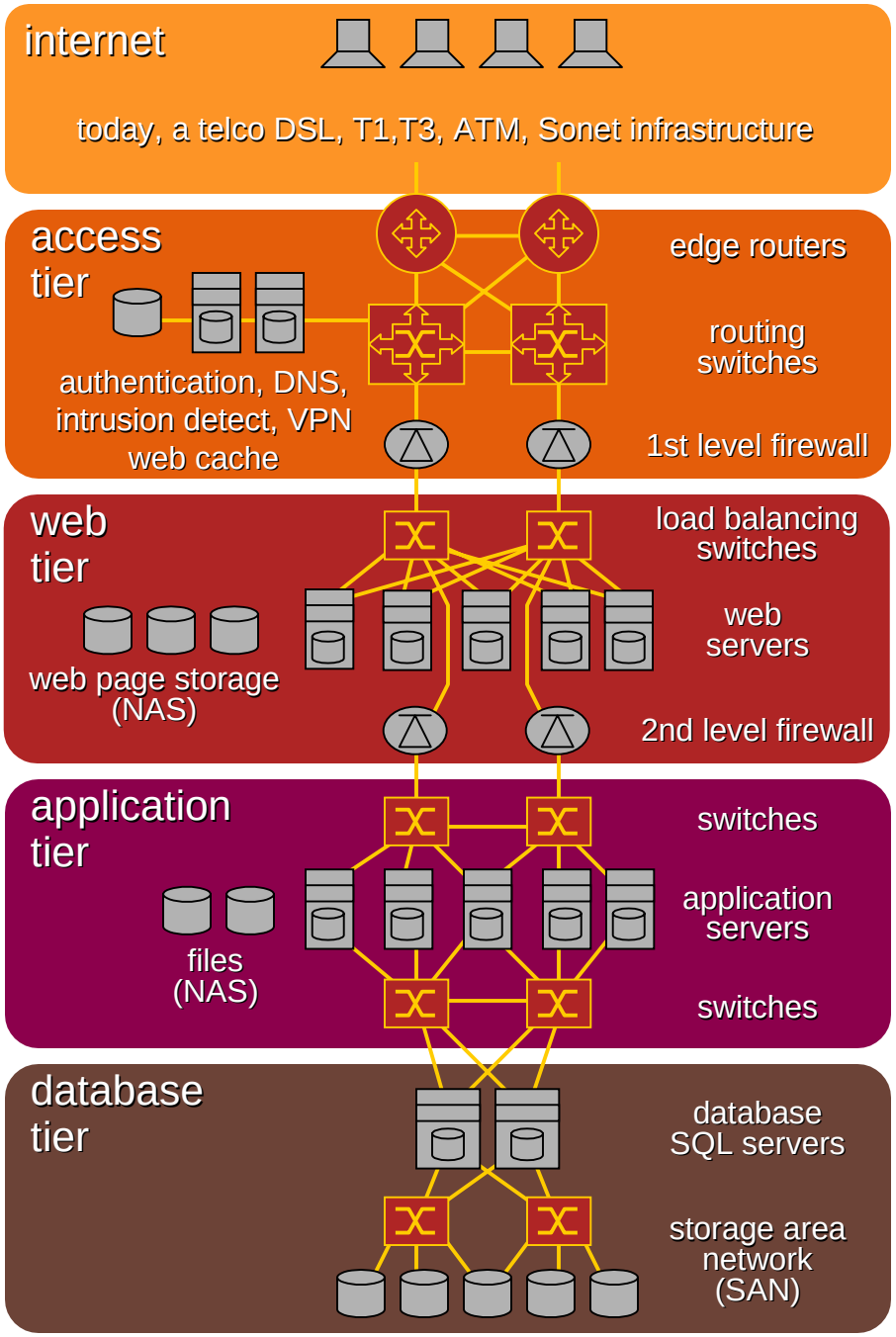
opportunities for innovations in storage

- disaggregated and isolated
- multiple fabrics and pools of storage
- limited by physical and logical isolation
  - scalability
  - flexibility
  - redundancy
  - deployment
  - management



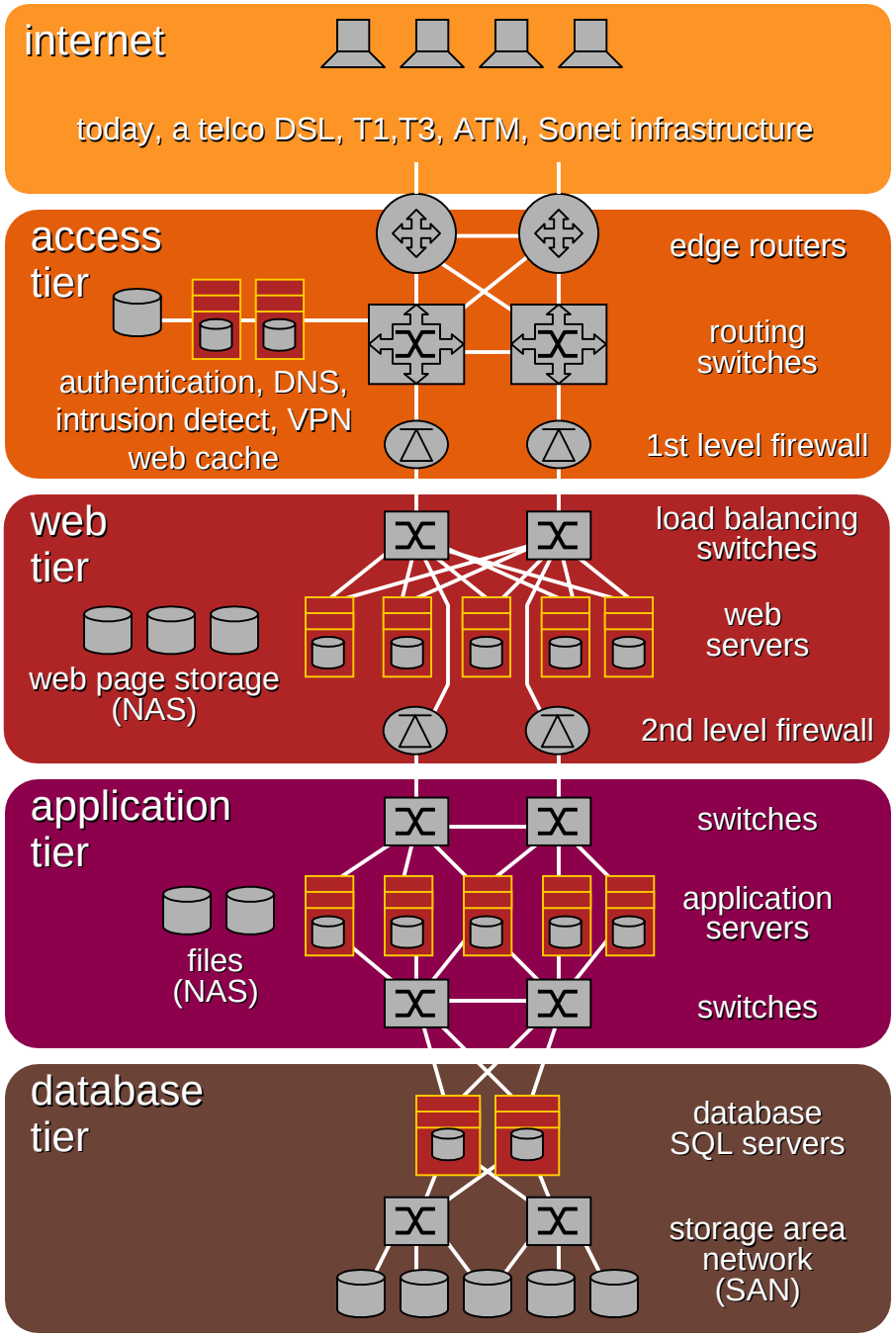
opportunities for innovations in switch fabric

- multiple fabrics
  - security concerns: lack understanding of traffic management
  - bandwidth concerns: no instrumentation
- redundancy
  - expensive
  - difficult to manage

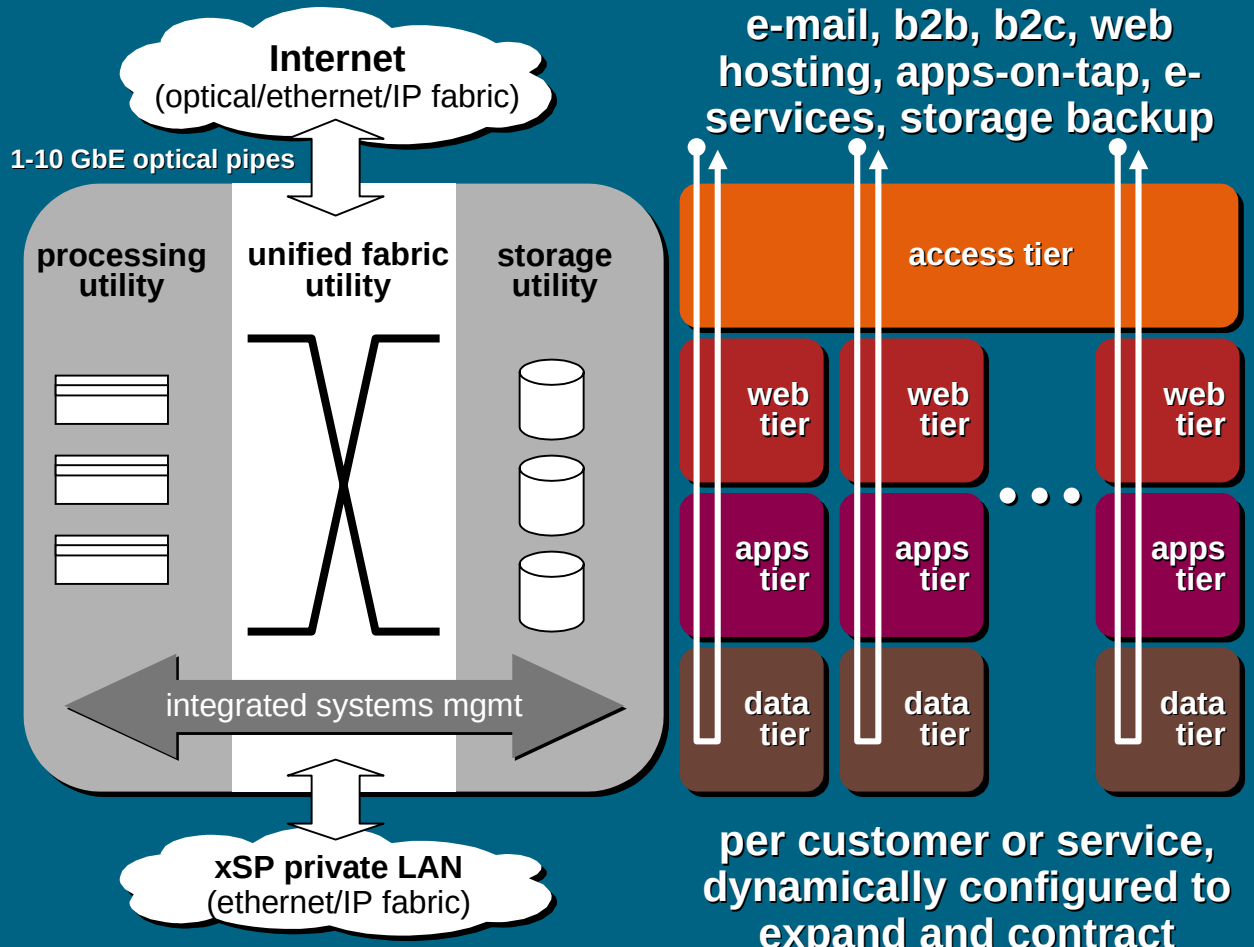


opportunities for innovation in processing

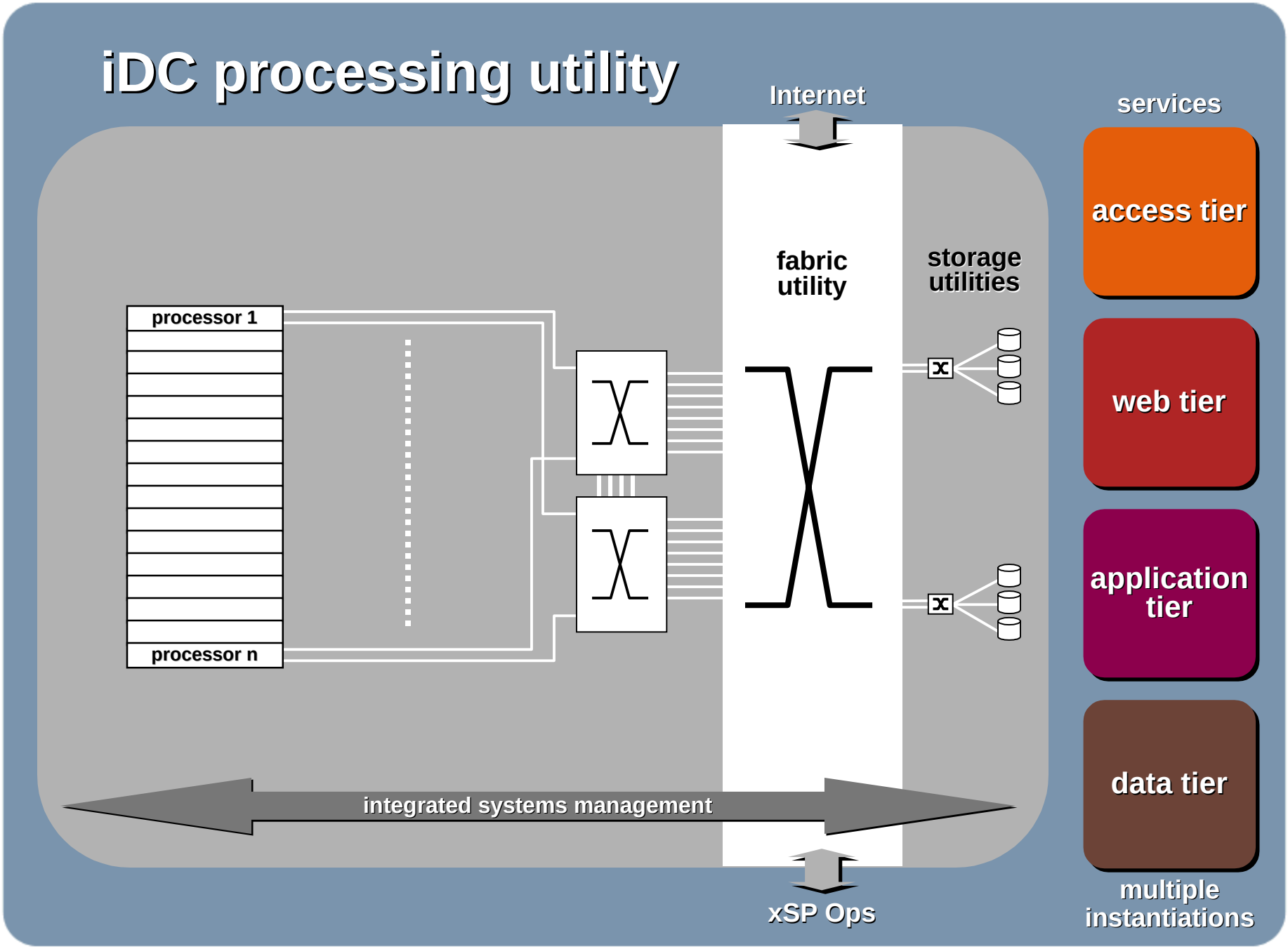
- "hardwired" & dedicated
- error-prone manual provisioning
  - requires physical access
  - configure each processor independently
  - rapid redeployment not possible
  - adding new resources is slow and labor intensive (not dynamic)



new age internet data center - iDC



- increase flexibility and improved time to revenue
- cut operational cost
- enable new services revenue
- guaranteed capacity
- integrated security



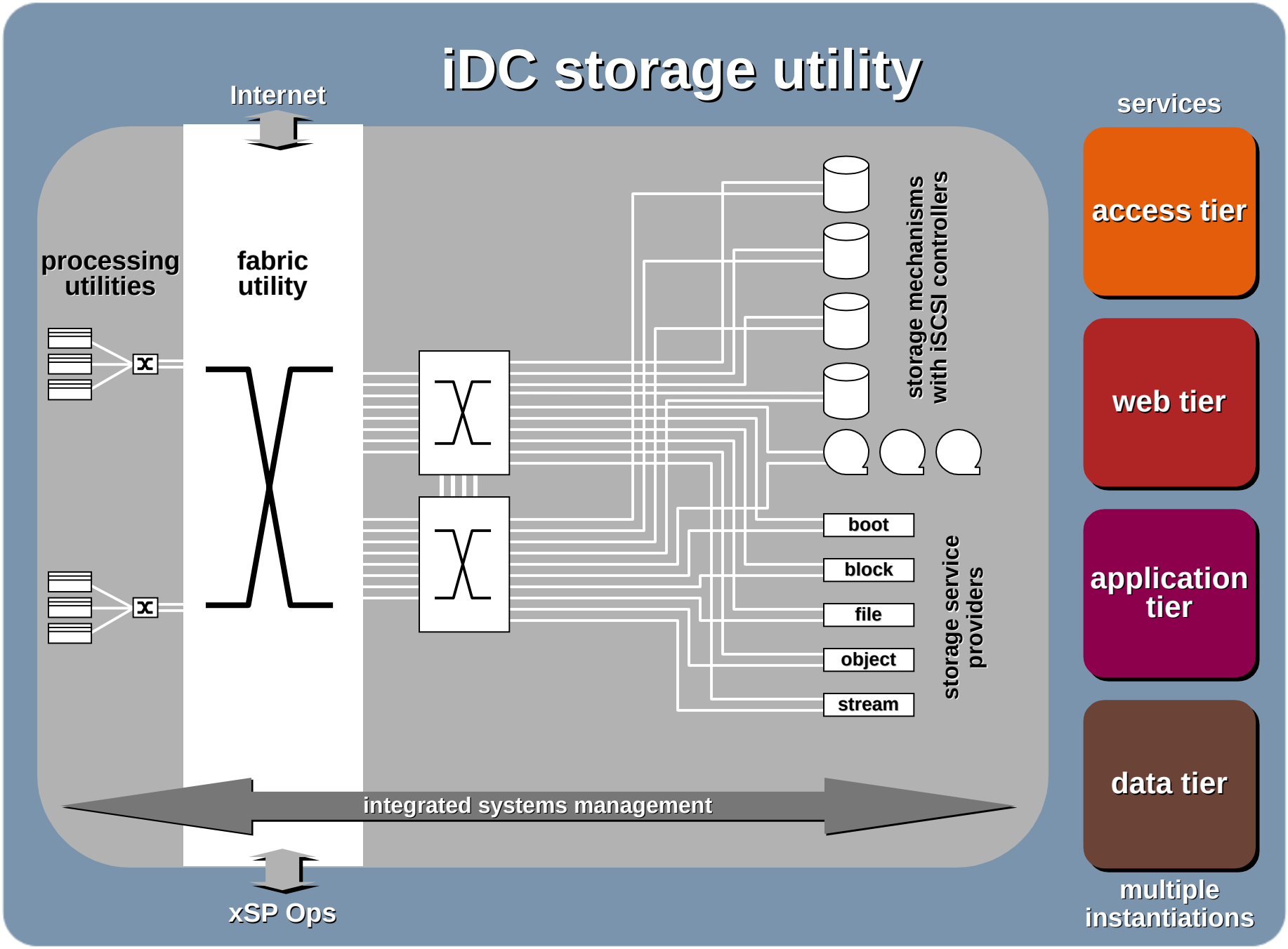
emerging alternatives in processing

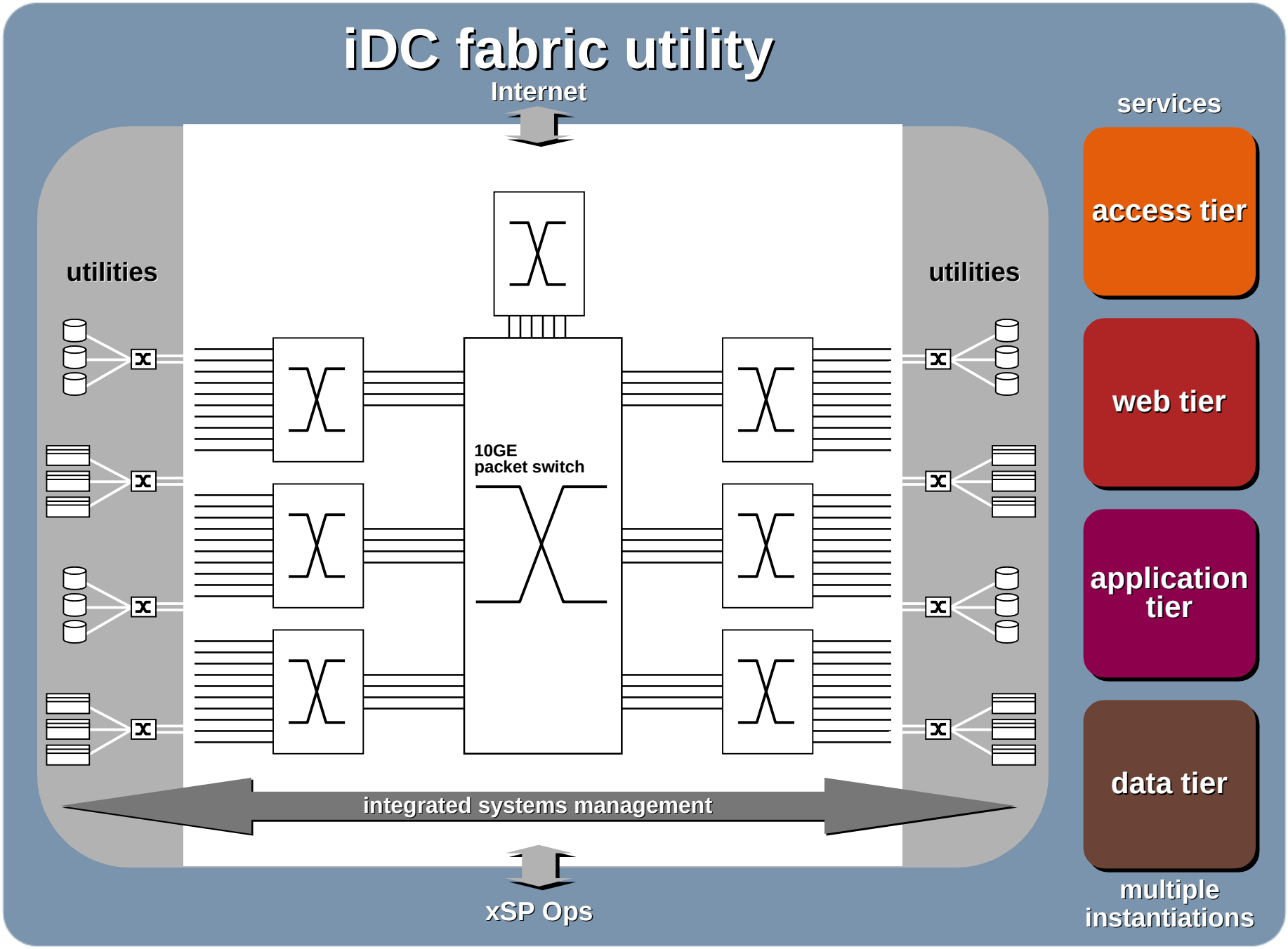
“proprietary” blade-based servers

- high density
- integrated networking
- integrated management environment

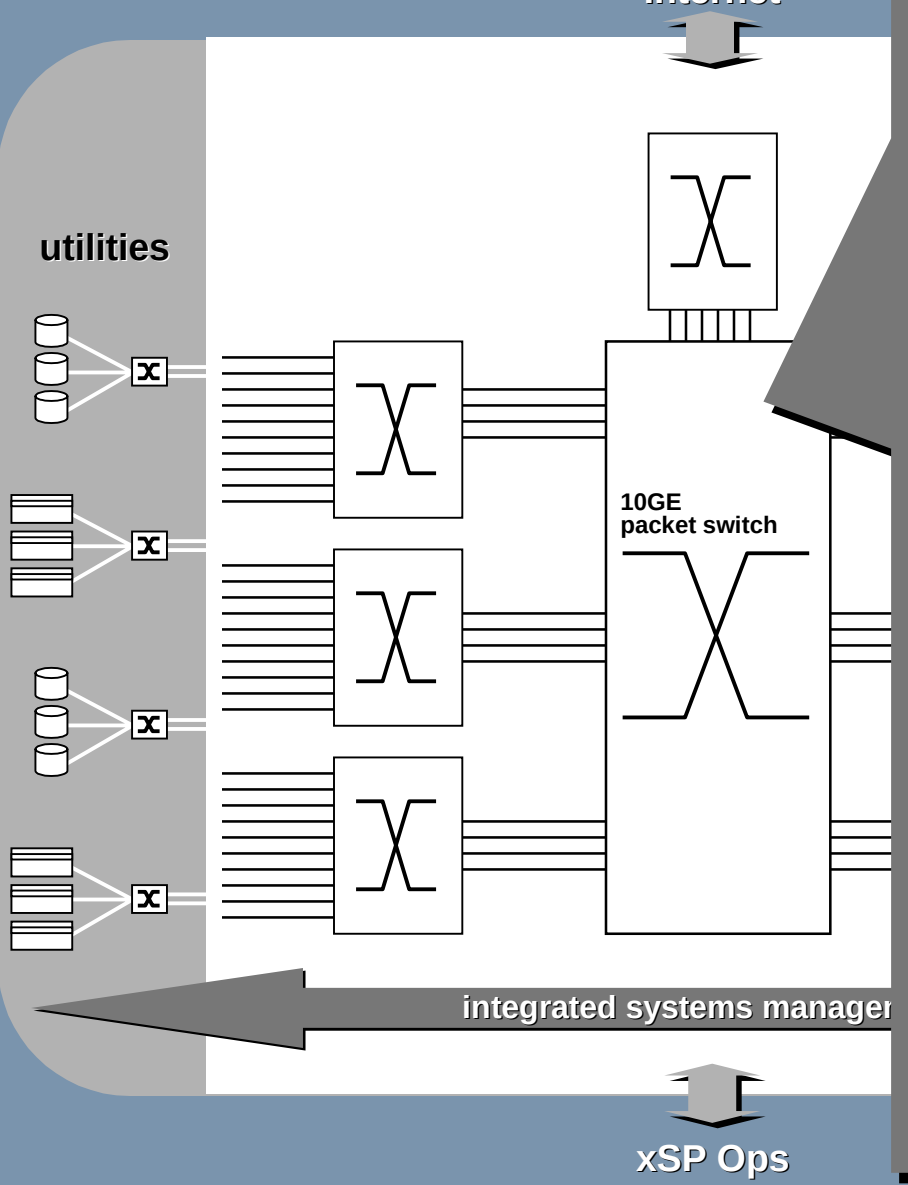
Infiniband blade-based servers and clusters

- similar to above
- uses Infiniband I/O and switching
- TCP/IP Ethernet to the data center





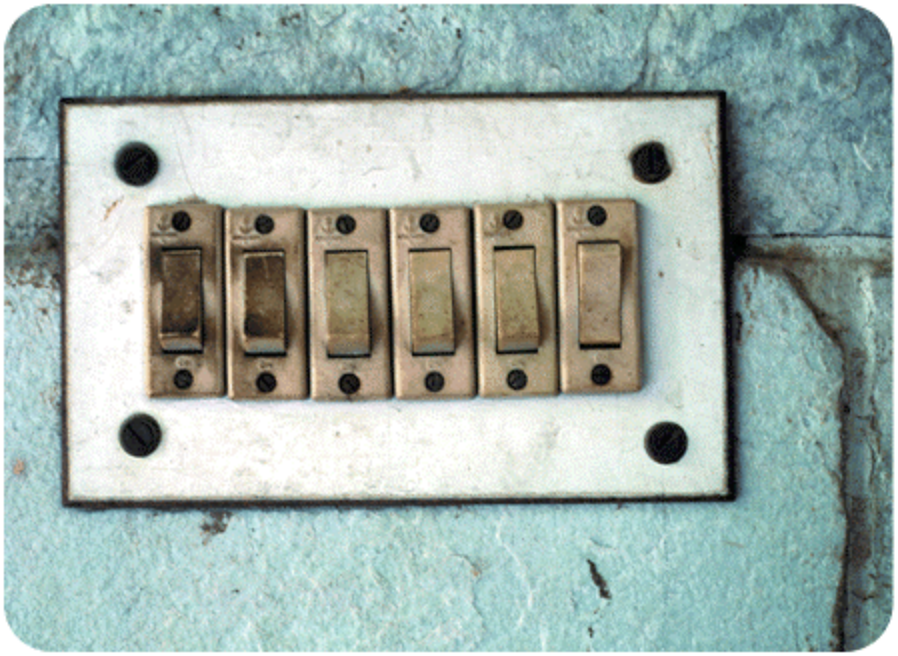
iDC fabric utility



fabric characteristics

- **traffic aware managed interconnect**
  - allows optimization of inter-switch mesh
  - extended RMON sampling understands end-to-end cross fabric traffic
  - dynamically eliminates any potential bottlenecks
- **scales to very large fabrics**
  - uses layer 2/3 class ethernet switches
  - programmable cross connect creates high available load balancing mesh
  - 12 switch mesh using alpha chassis provides up to 336 gig E ports to the edge
- ***virtual non-blocking* logically partitioned fabric**
  - fully packet switched “virtual wiring system”
  - VLANs provide virtual secure domains
  - programmatically creates *vertical* tier-to-tier paths and *horizontal* processor-to-storage paths
    - vertical & horizontal can be configured as “separate” fabrics (no shared traffic) buy designating edge switches as vertical or horizontal connection points for physical wiring
    - and implementing processor switches with vertical and horizontal roles -- see processor utility implementation

you should be able to quickly ignite a scalable, robust service when your business requires it



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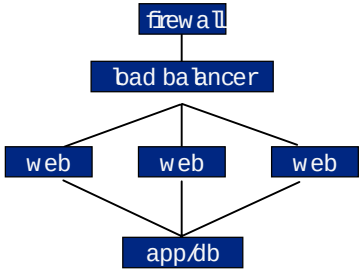
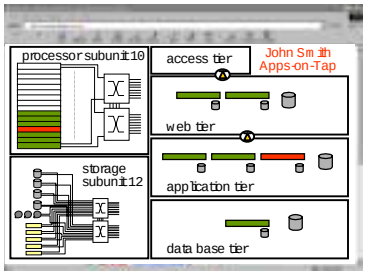


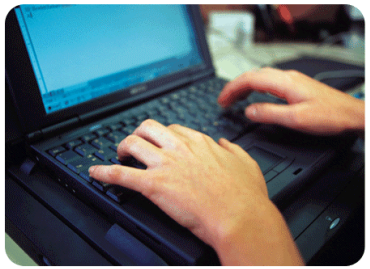
define the service

2



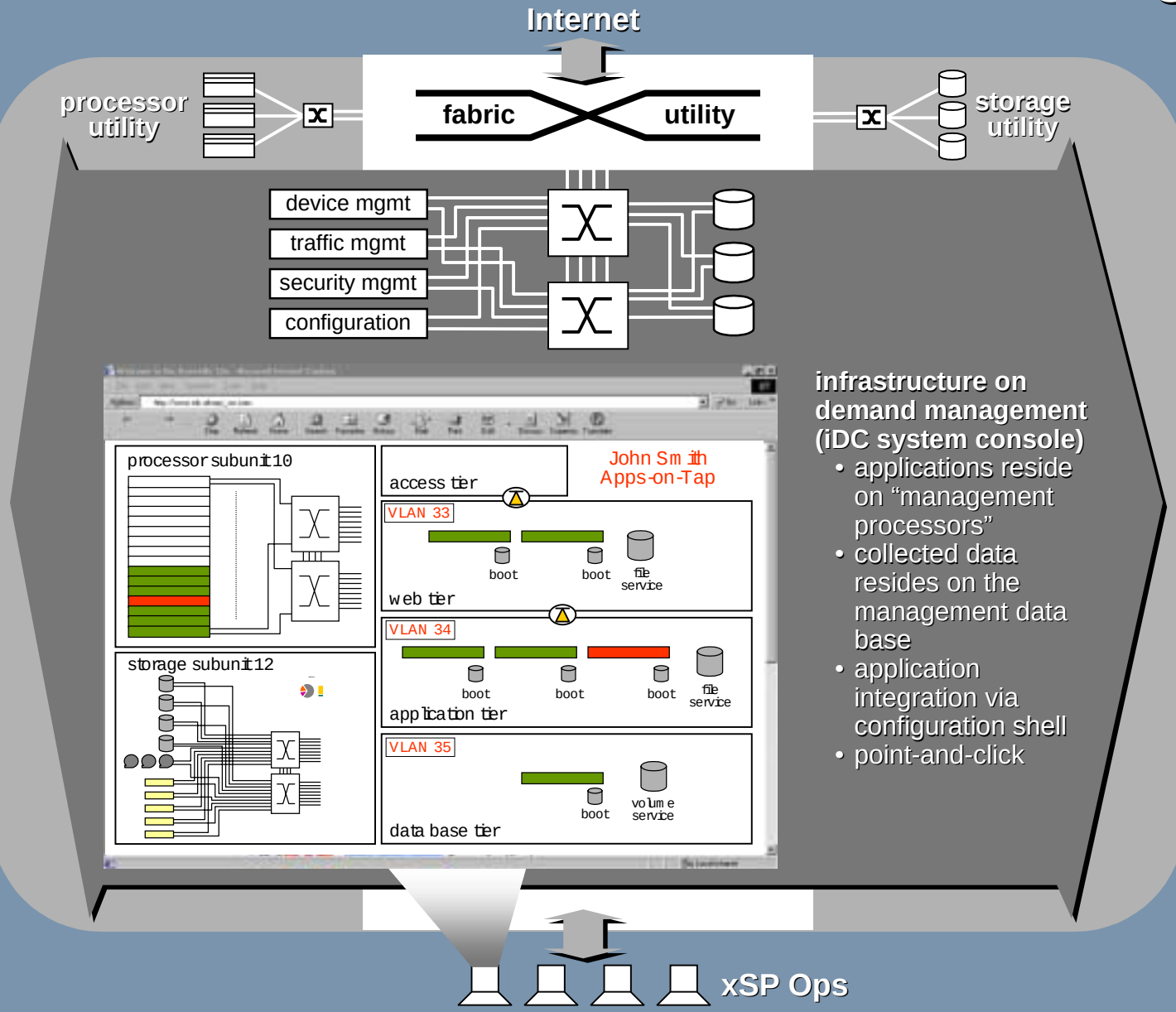
choose service levels and allocate resources

3



ignite the service

iDC infrastructure on demand management



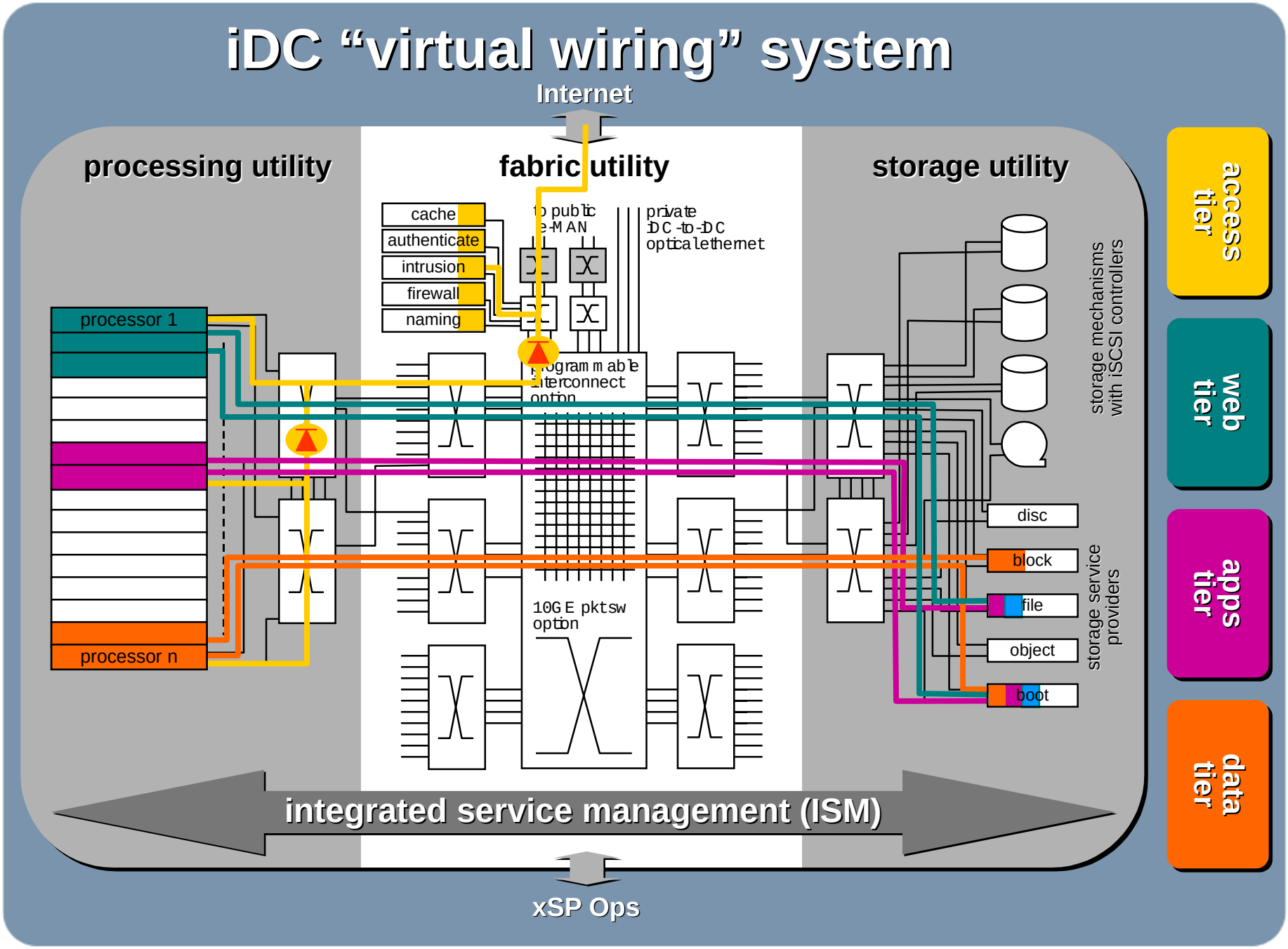
infrastructure on demand management (iDC system console)

- applications reside on “management processors”
- collected data resides on the management data base
- application integration via configuration shell
- point-and-click

services

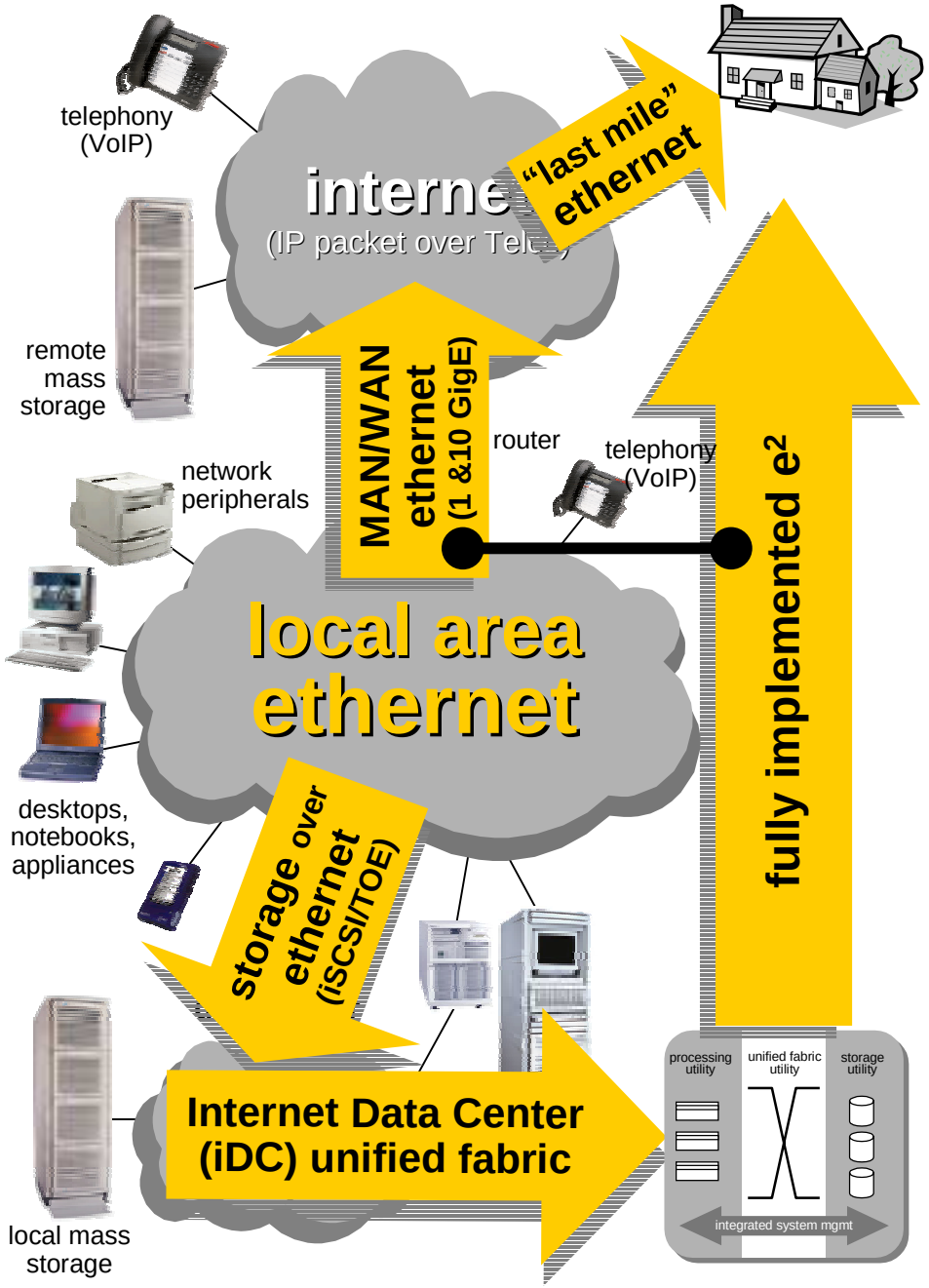
- access tier
- web tier
- application tier
- data tier

multiple instantiations



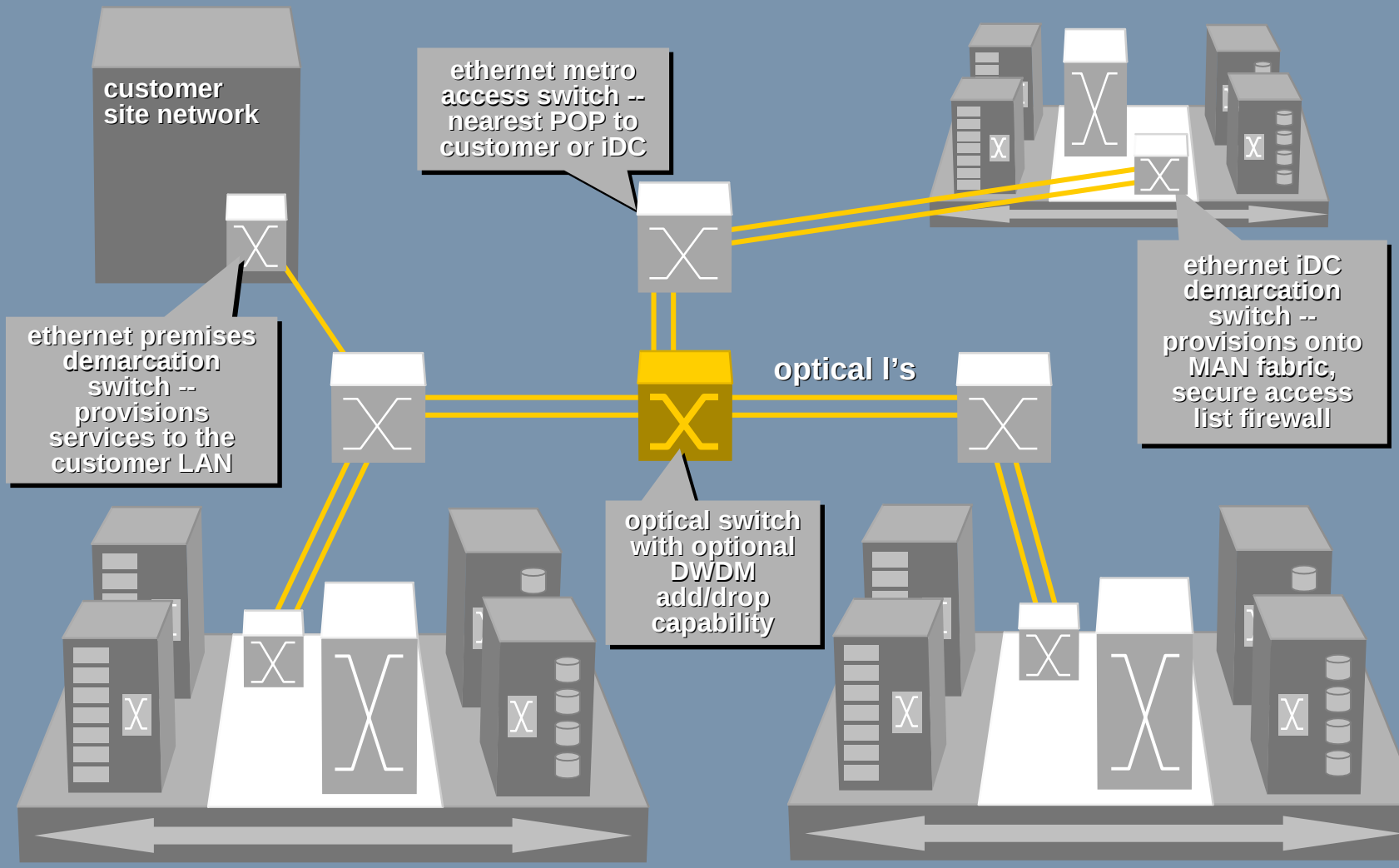
e² ethernet everywhere

the new internet data centers or iDCs will take advantage of the new "e-MANs" and "e-WANs" to deliver high performance services to business …



optical iDC

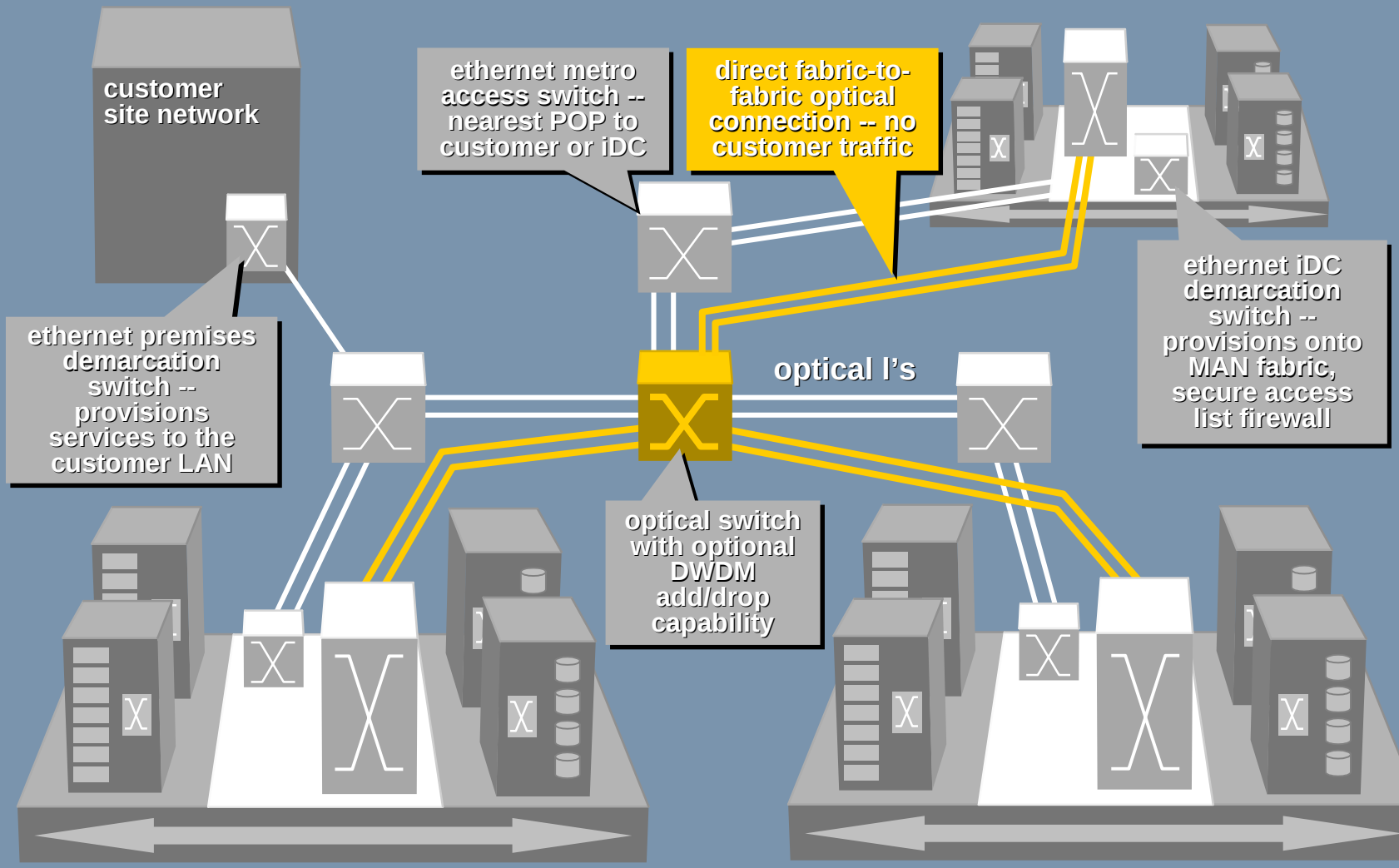
public optical ethernet MAN (e-MAN) fabric-to-fabric



the unified fabric extended seamlessly to enterprise customers

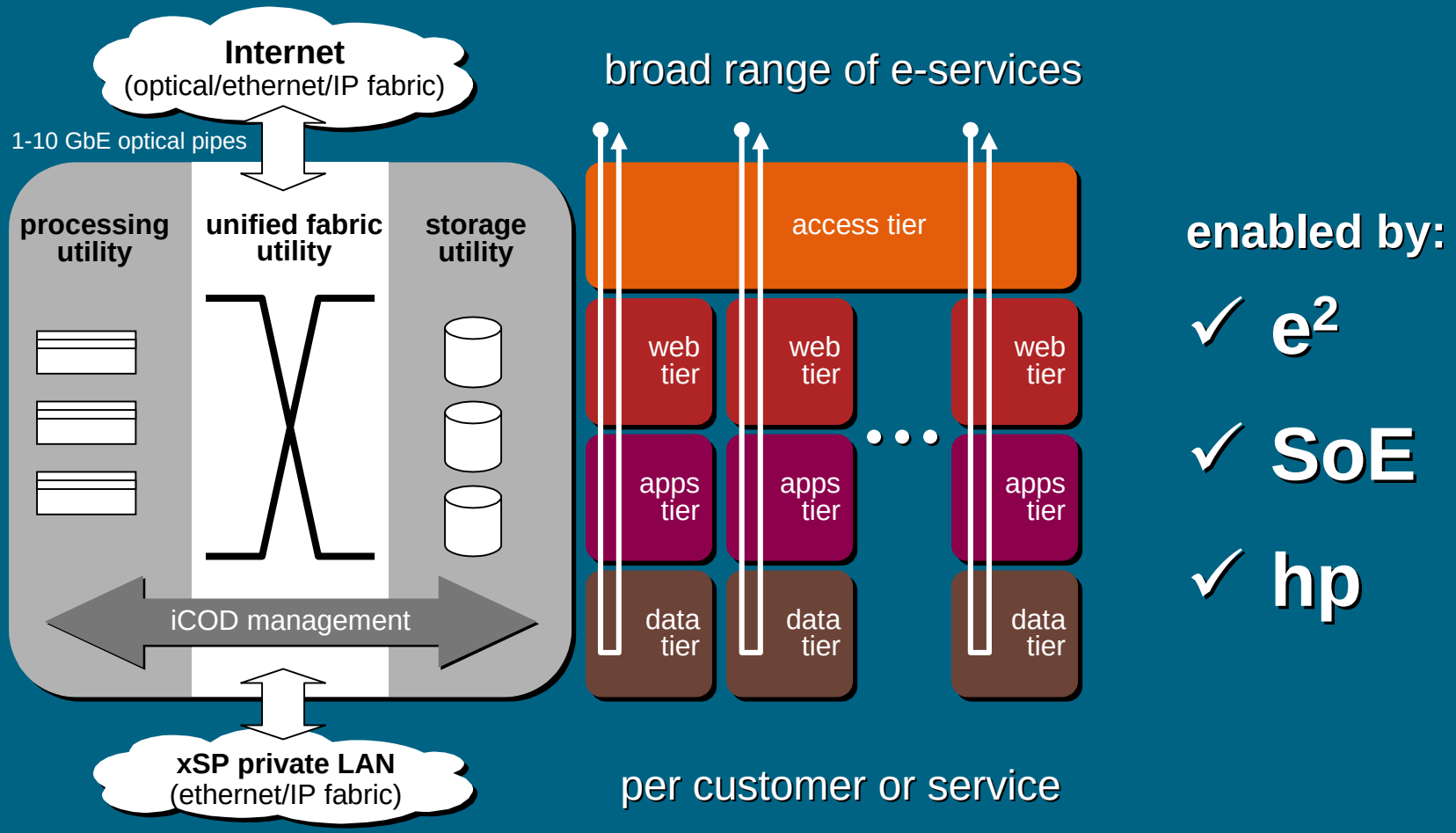
optical iDC

private direct optical ethernet fabric-to-fabric



the unified fabric extended seamlessly to multiple data centers

hp's new age internet data center

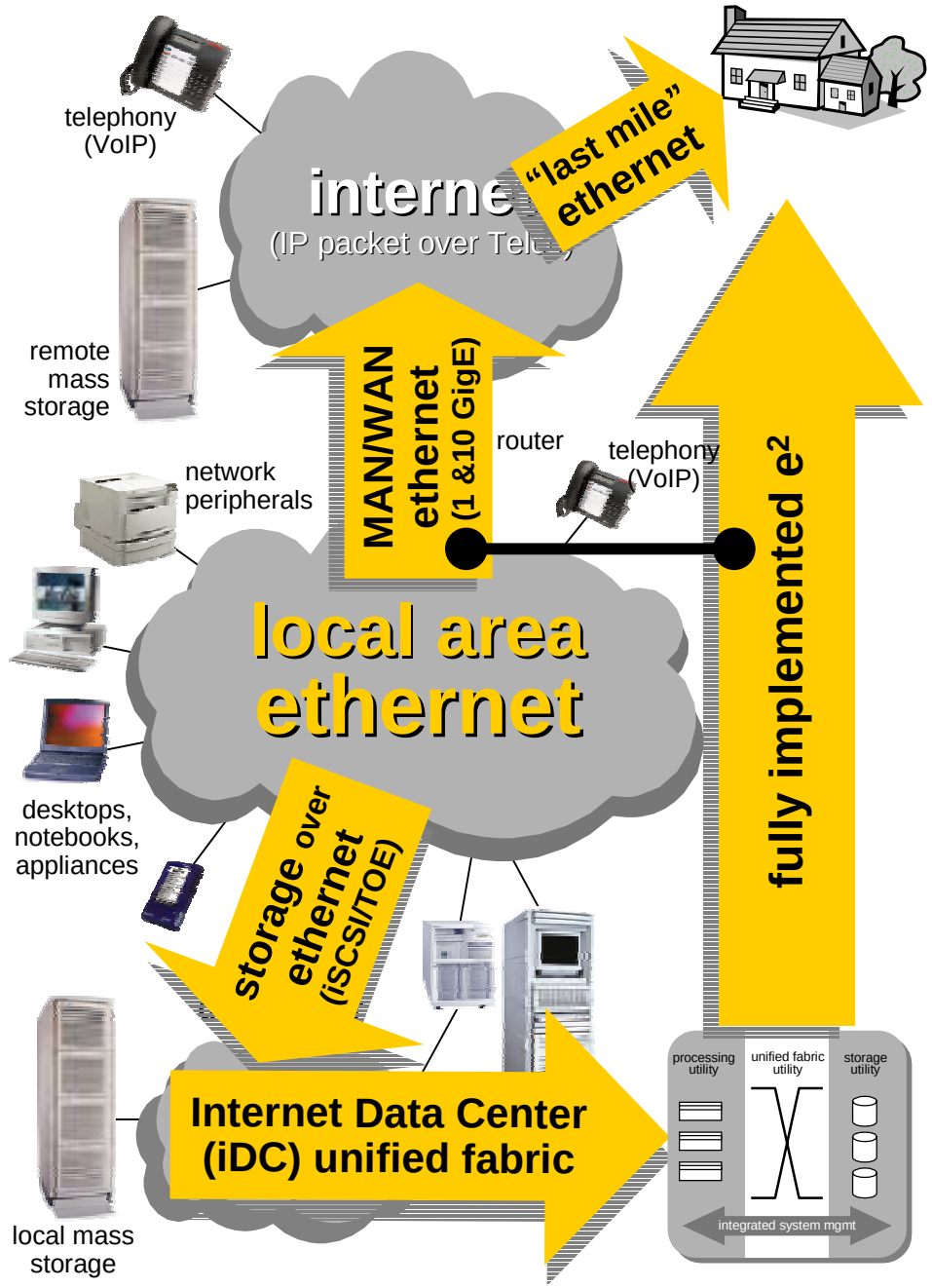


enabled by:

- ✓ e²
- ✓ SoE
- ✓ hp

e² ethernet everywhere

converging computing, storage, voice, video and the Internet into a *seamless* interoperable switch fabric *… ethernet*



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