



μ

μ



Automatically Switched Optical Network



μ

μ

OTN

SDH

μ

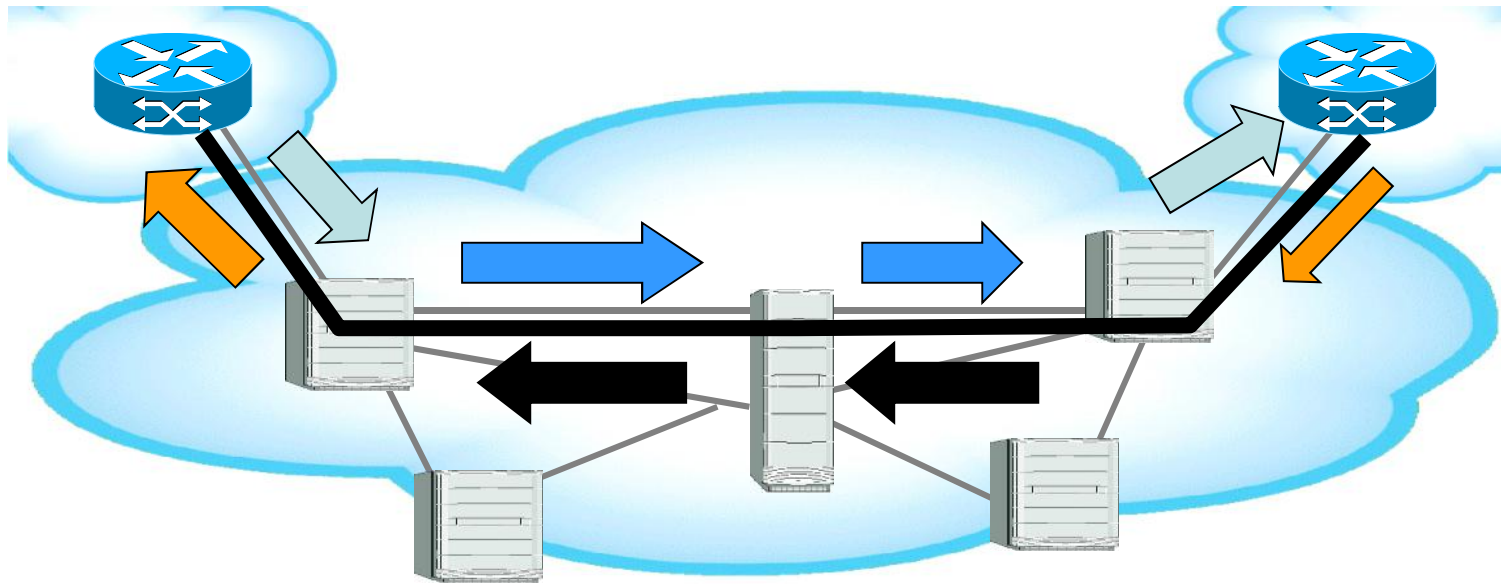
μ

μ μ

μ

μ

μ





□ To ASON

- μ (end-to-end provisioning),
- μ .
- μ , :
- bandwidth on demand
- ,
- μ μ μ .
- μ μ μ :
- SDH/SONET
- IP
- Ethernet ATM



μ

μ

?



—

—

(. .)



μ

μ

μ

$\mu\mu$

—

μ

Constraint Shortest Path First

(CSPF)

—

μ

—

μ

μ



—

μ

,

μ



μ



-

μ

μ

μ

μ

μ

.



μ

-

μ

μ

μ



-

-

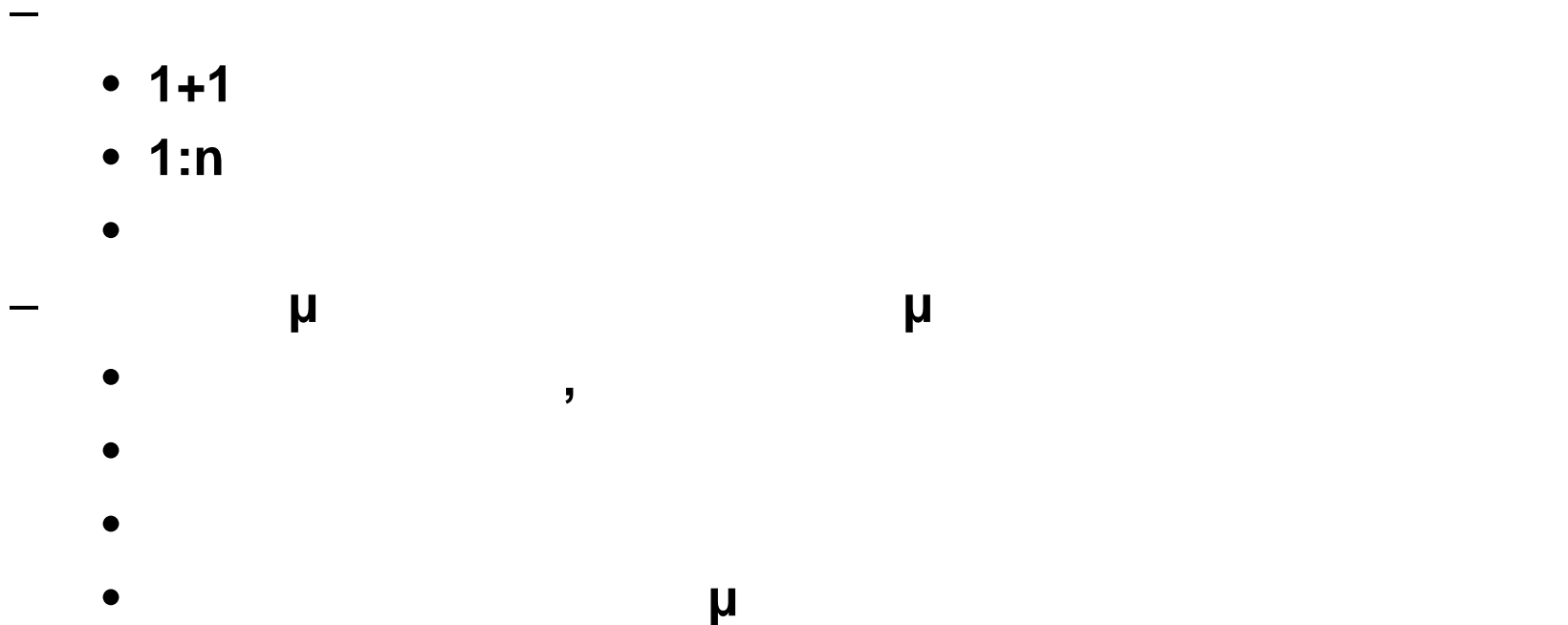
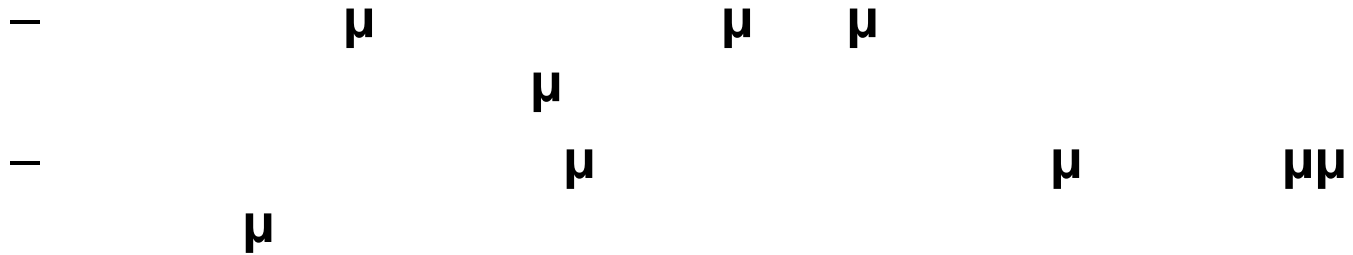
•

•

•



(reliability)





—

,

,

•

▪



μ

—

μ

μ

μ (alarm)

—

μ

,

—

(restoration),

μ

μ



μ

—

μ

μ

μ

μ



μ

μ

—



μ

-

μ

-

μ

-

μ

-

μ



-

μ

-

μ

-

μ



-

μ

μ

SLA



ASON

μ

μ

μ

.

μ

.



ASON

(domains)

μ

μ

.



μ

.



μ

μ

exterior node-to-node interface (E-NNI).



E-NNI

“intra-operator”

“inter-

operator”.



□ I-NNI (interior NNI) μ

μ μ μ
μ μ μ

□

μ μ μμ

□

“user” μ

μ

μ

□

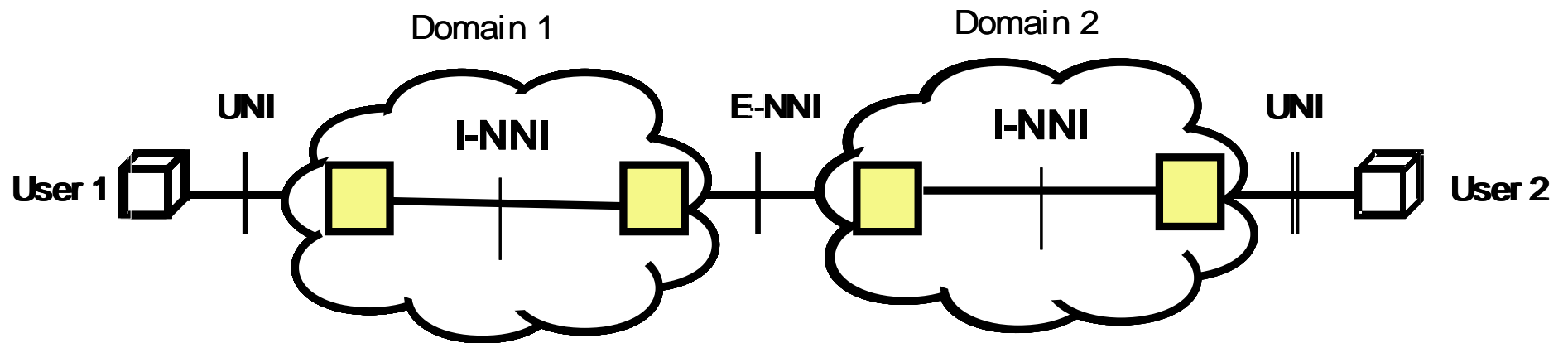
ASON,

μ

μ

,

user-network interface (UNI).

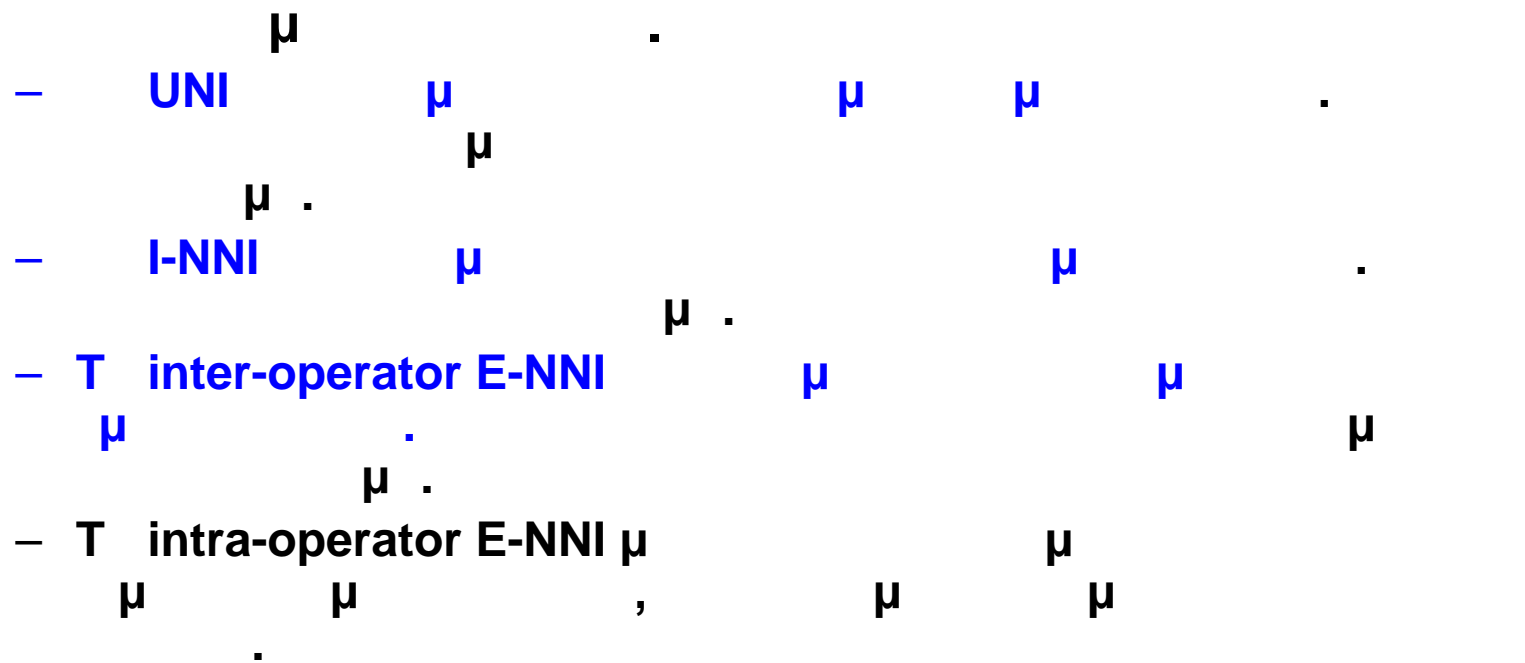


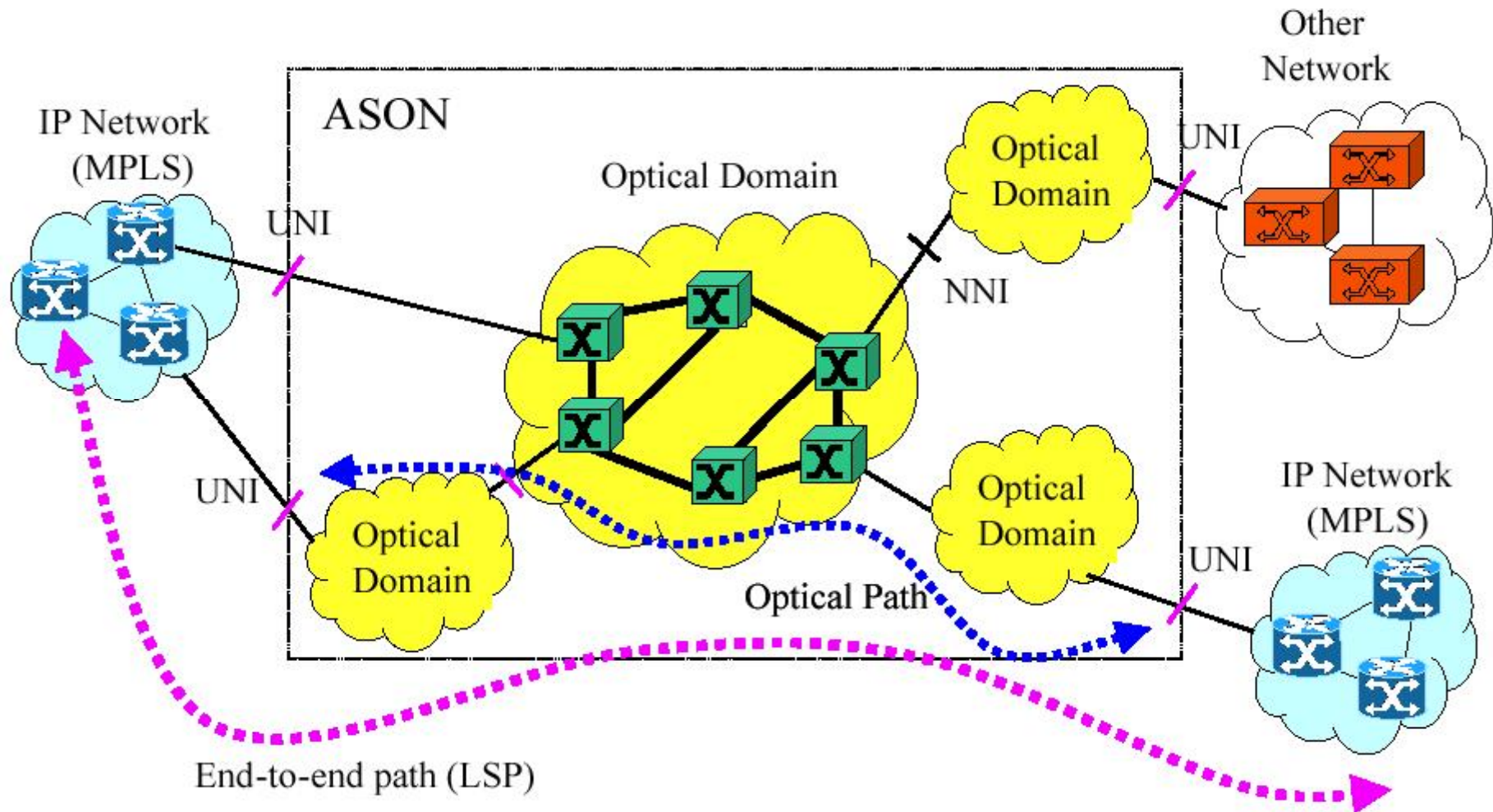


UNI, E-NNI

I-NNI

- UNI, E-NNI I-NNI
(reference points)",
μ
(standardized)







ASON



μ



μ

:

-

:

μ

μ

μ

:

μ

μ

(SLA)

-

:

μ

,

μ

-

,

-

:

μ

μ

,

μ

.

-

:

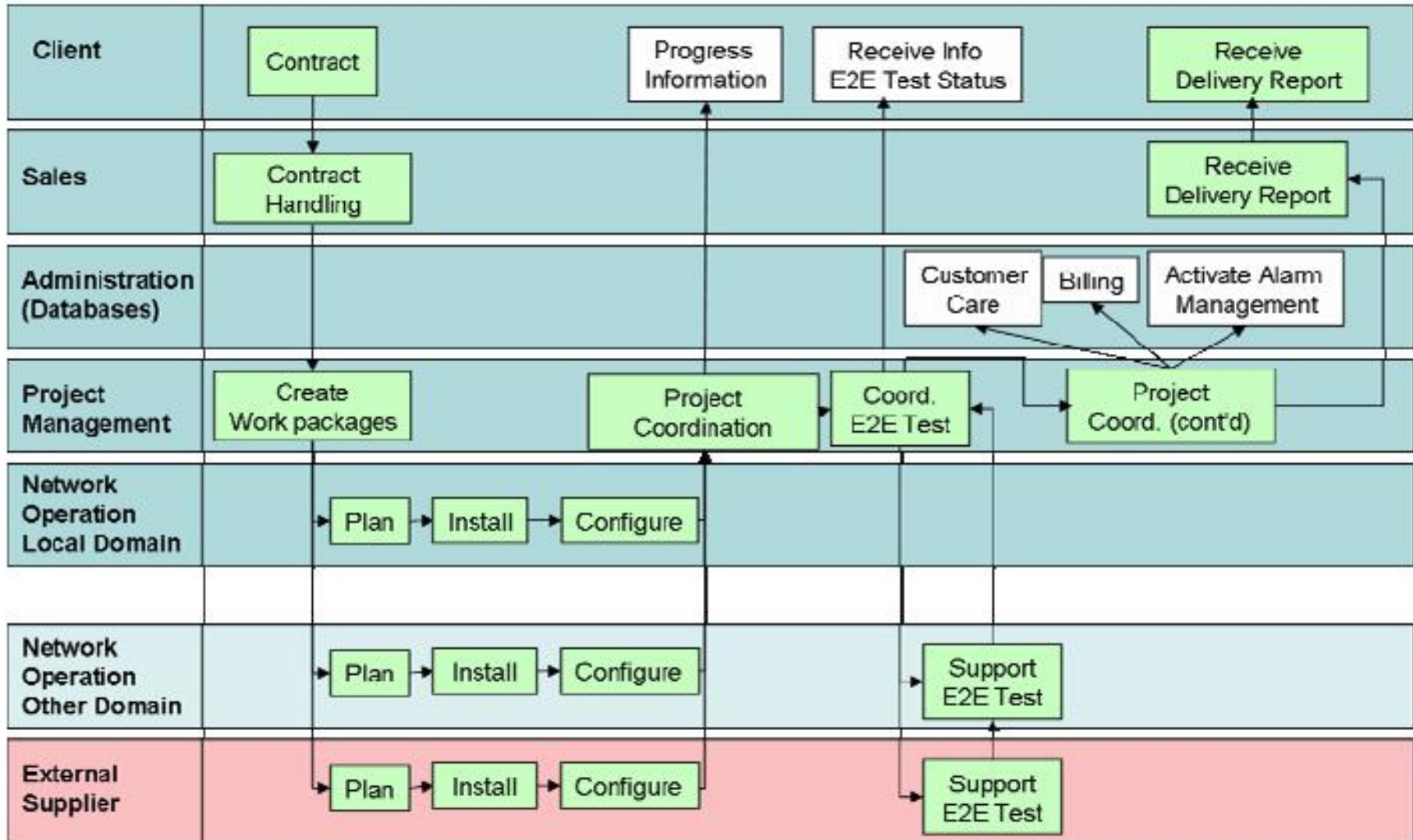
μ

μ

.



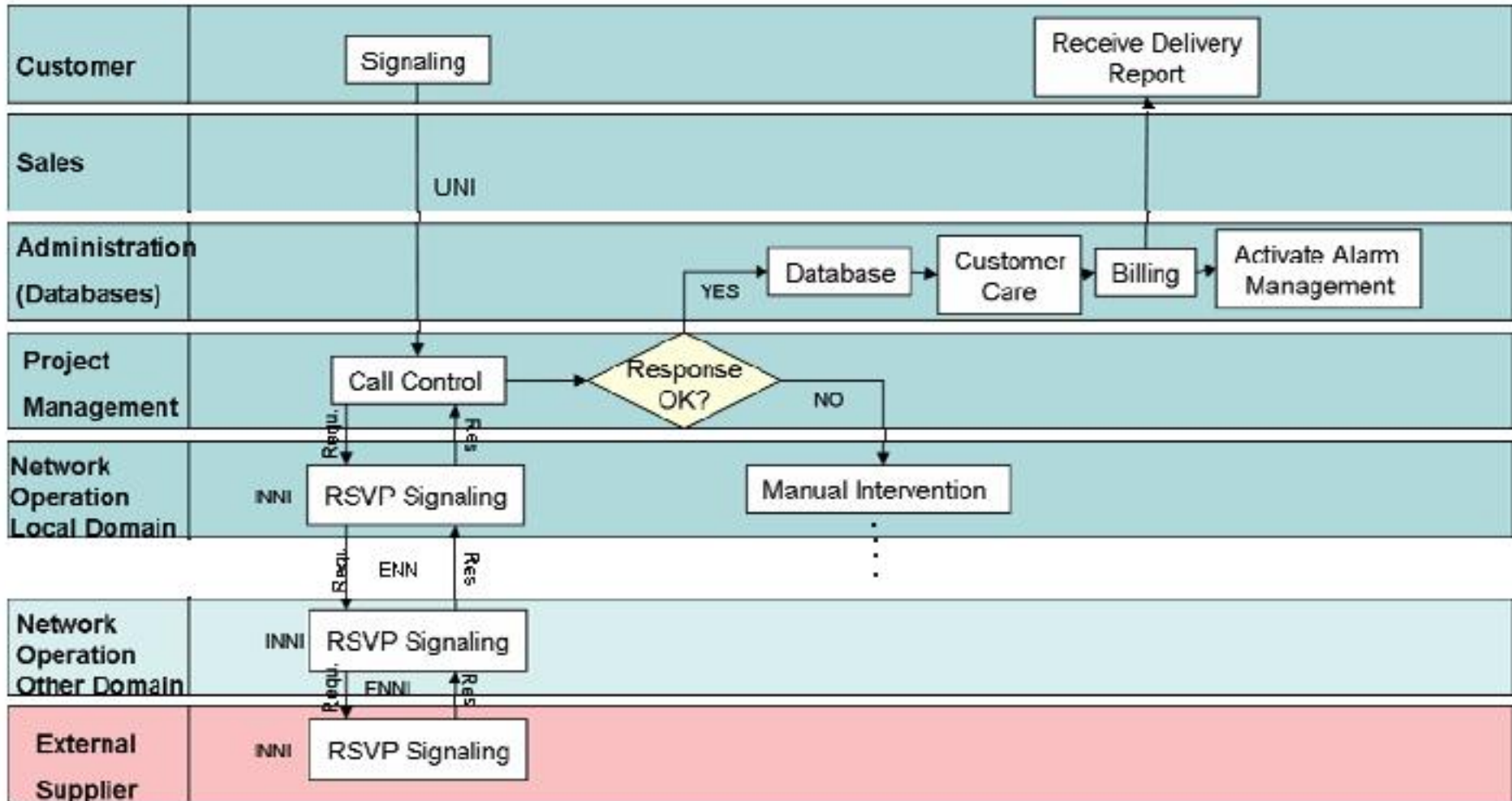
- μ μ





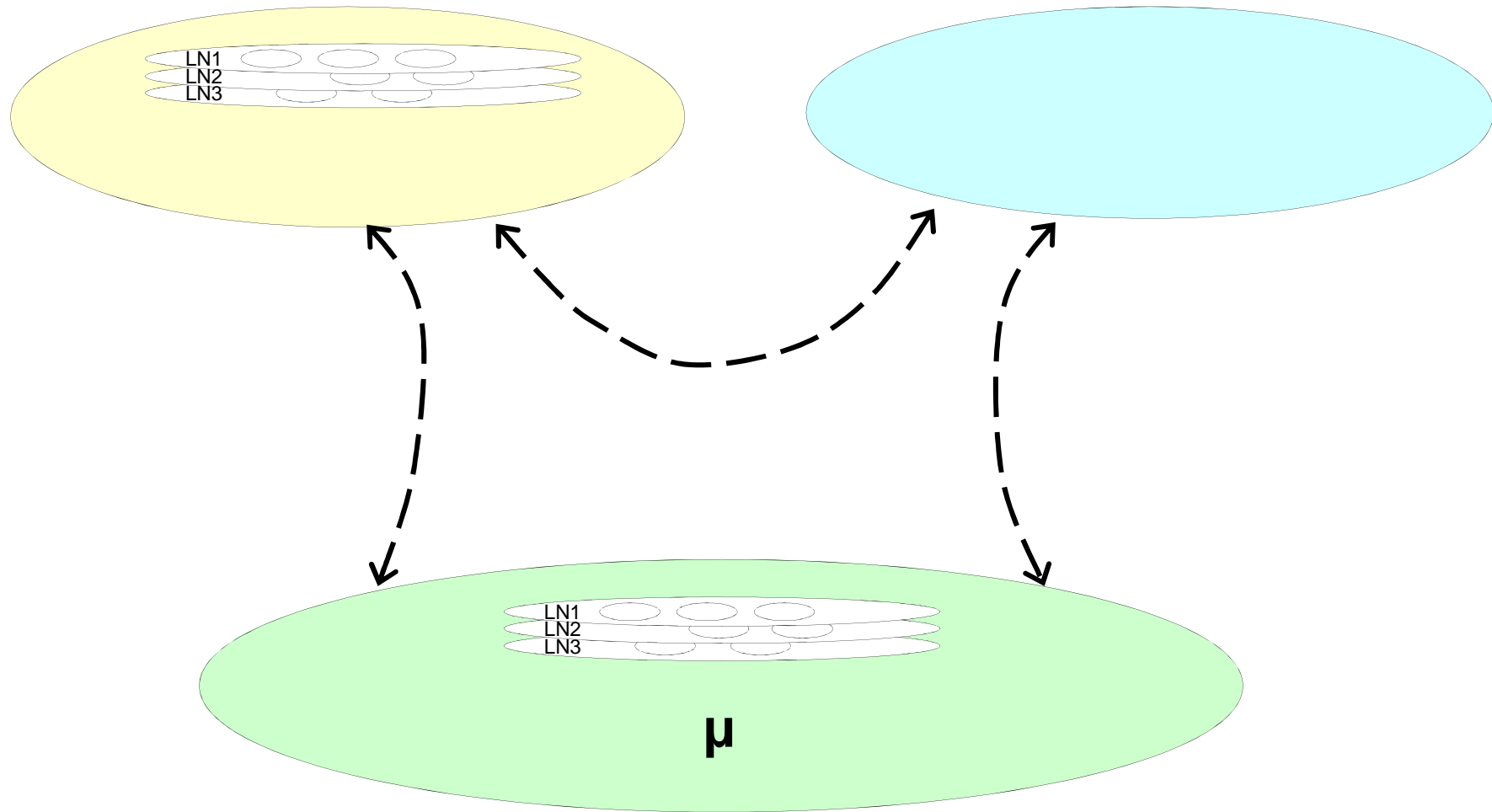
μ

μ





ASON





(Transport Plane)



μ

μ

μ

.

μ

μ

.



«

» (Network

Elements)

—

—

μ

(SDH/SONET)

(OTN)



(Control Plane)



(signaling),

μ

μ

μ

μ



μ

«

» (Optical Connection Controller)



:

—

μ

—

μ

—

μ

—



(Management Plane)



.

.

μ

μ

μ



«

μ

»

(Network Management System)

—

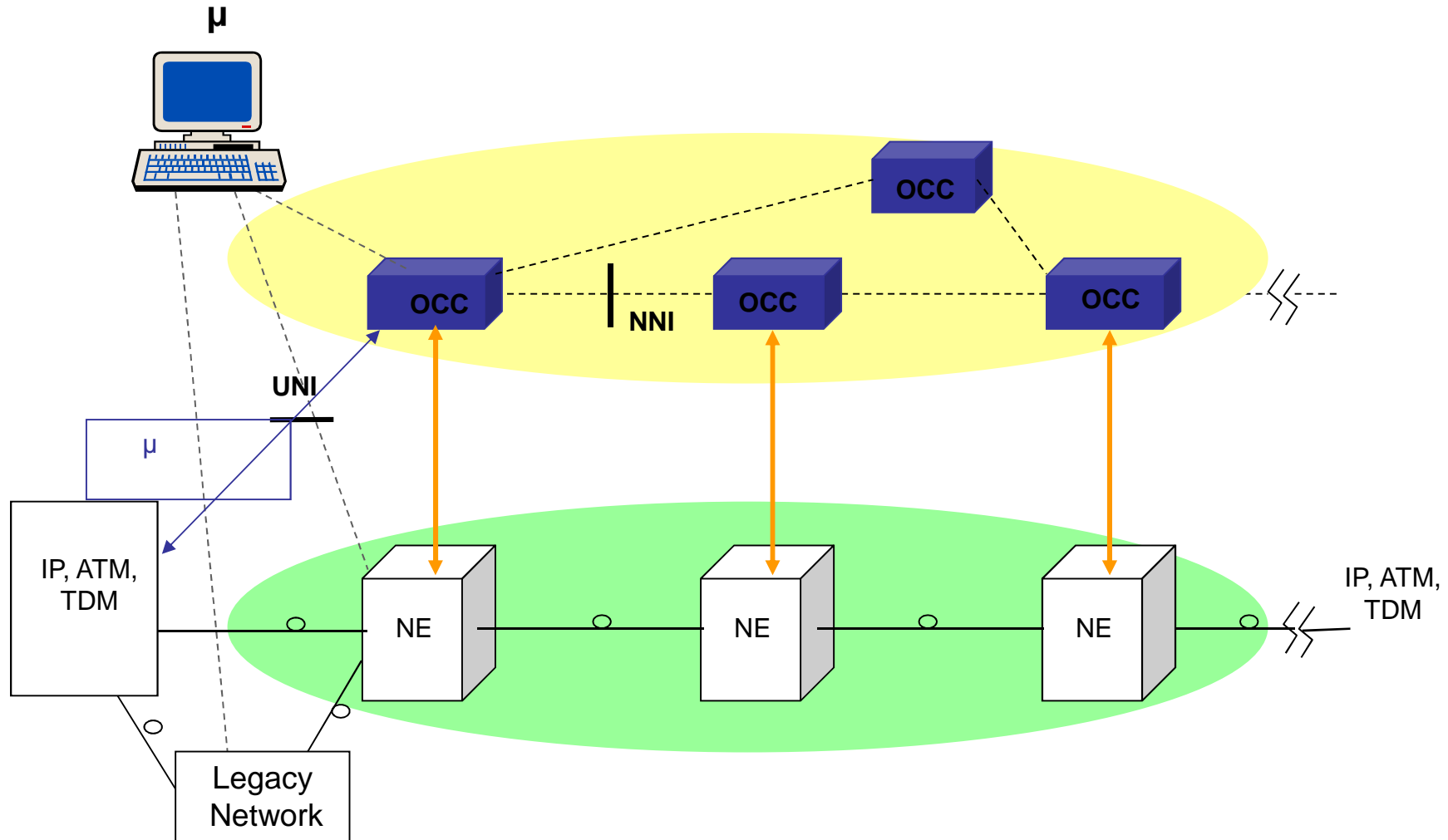
μ

μ

.



ASON



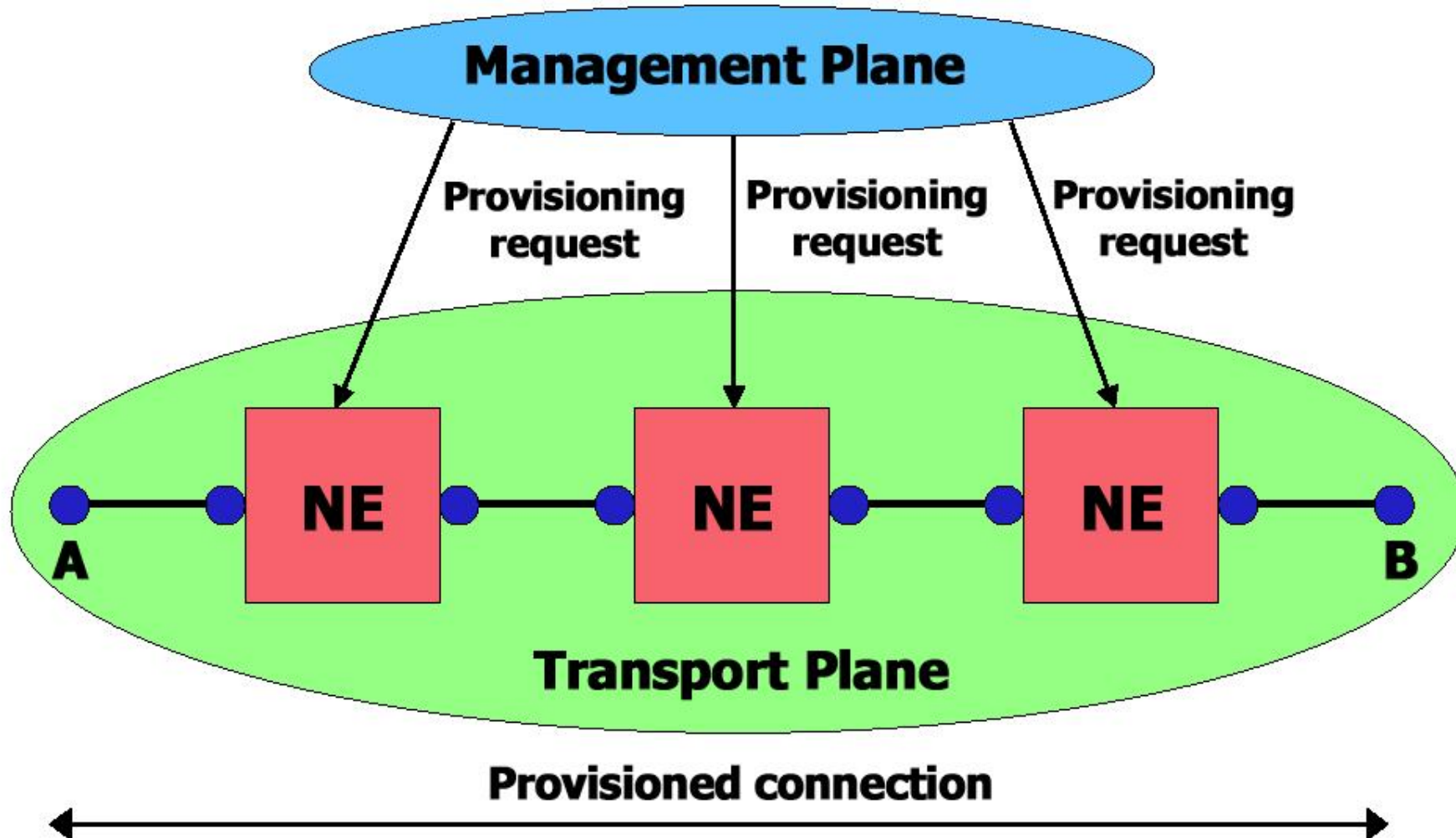


:

- Permanent: μ μ
(network mag/ment) μ
(signaling).
- Switched: μ μ
 μ μ .
- Soft permanent: μ μ μ μ

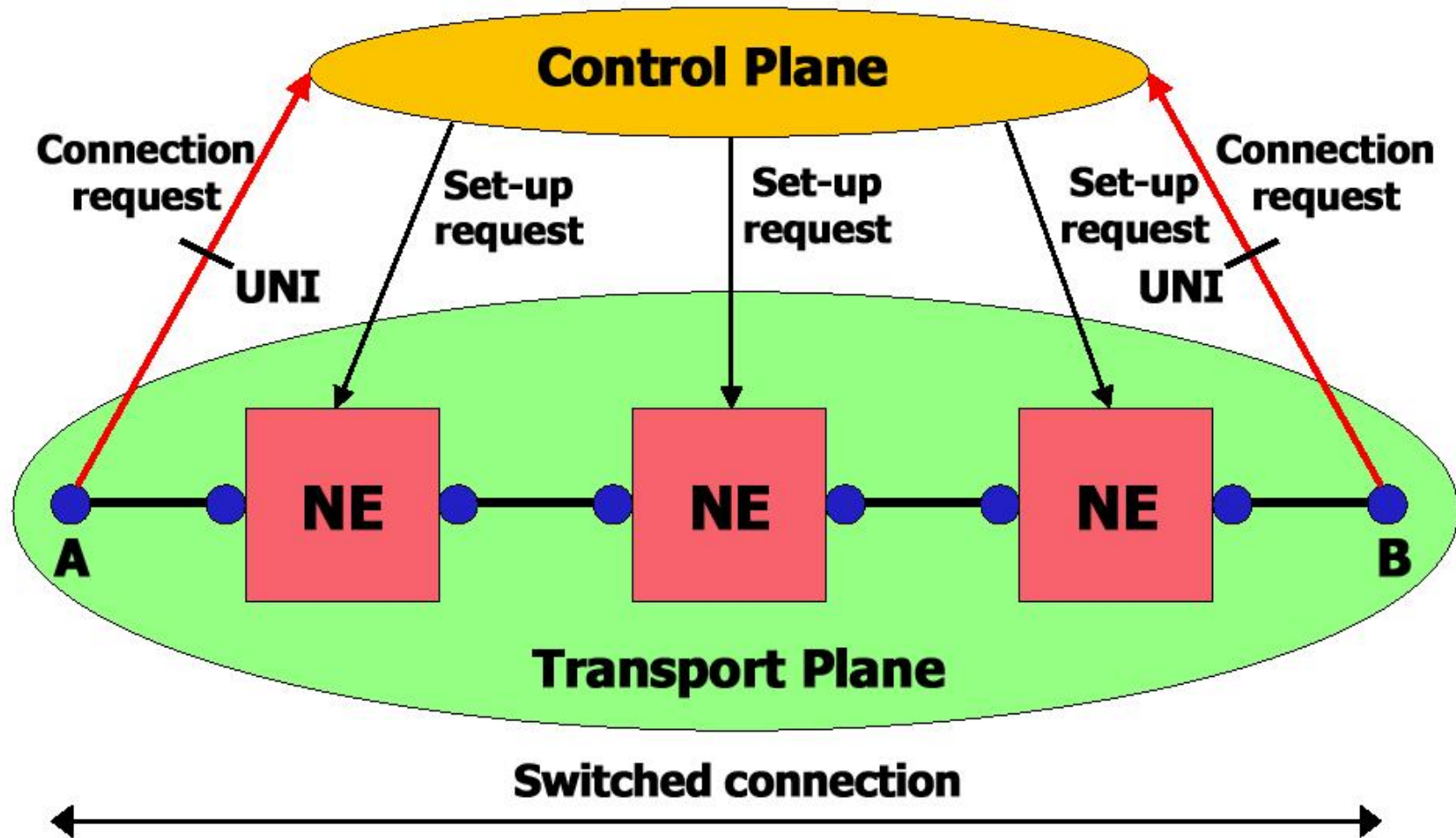


“Permanent”



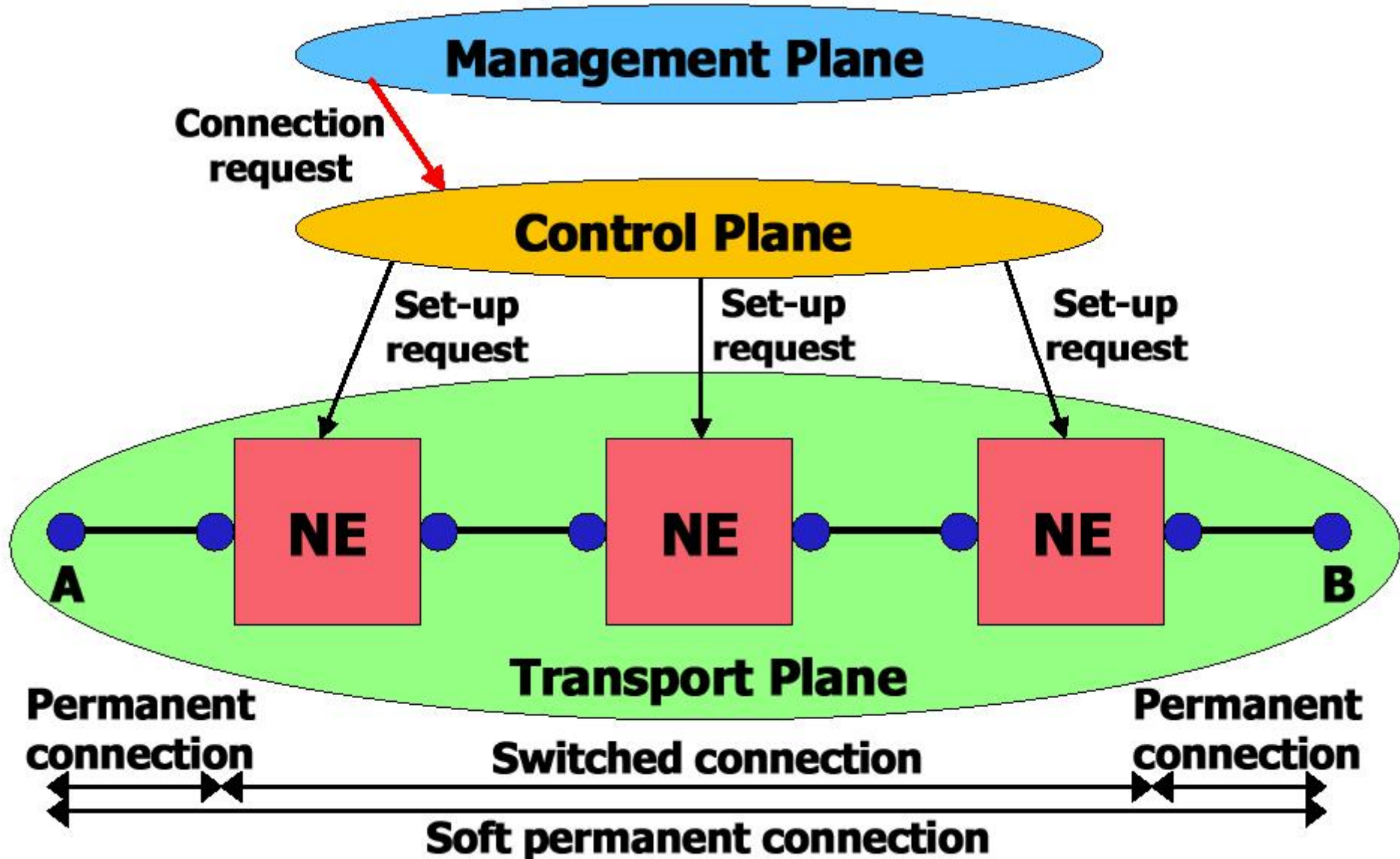


“Switched”





“Soft permanent”





μ

ASON

□ “soft permanent”

μ

—

μ

—

μ

μ

μ

□ “switched”

,

—

—

□

(CP)

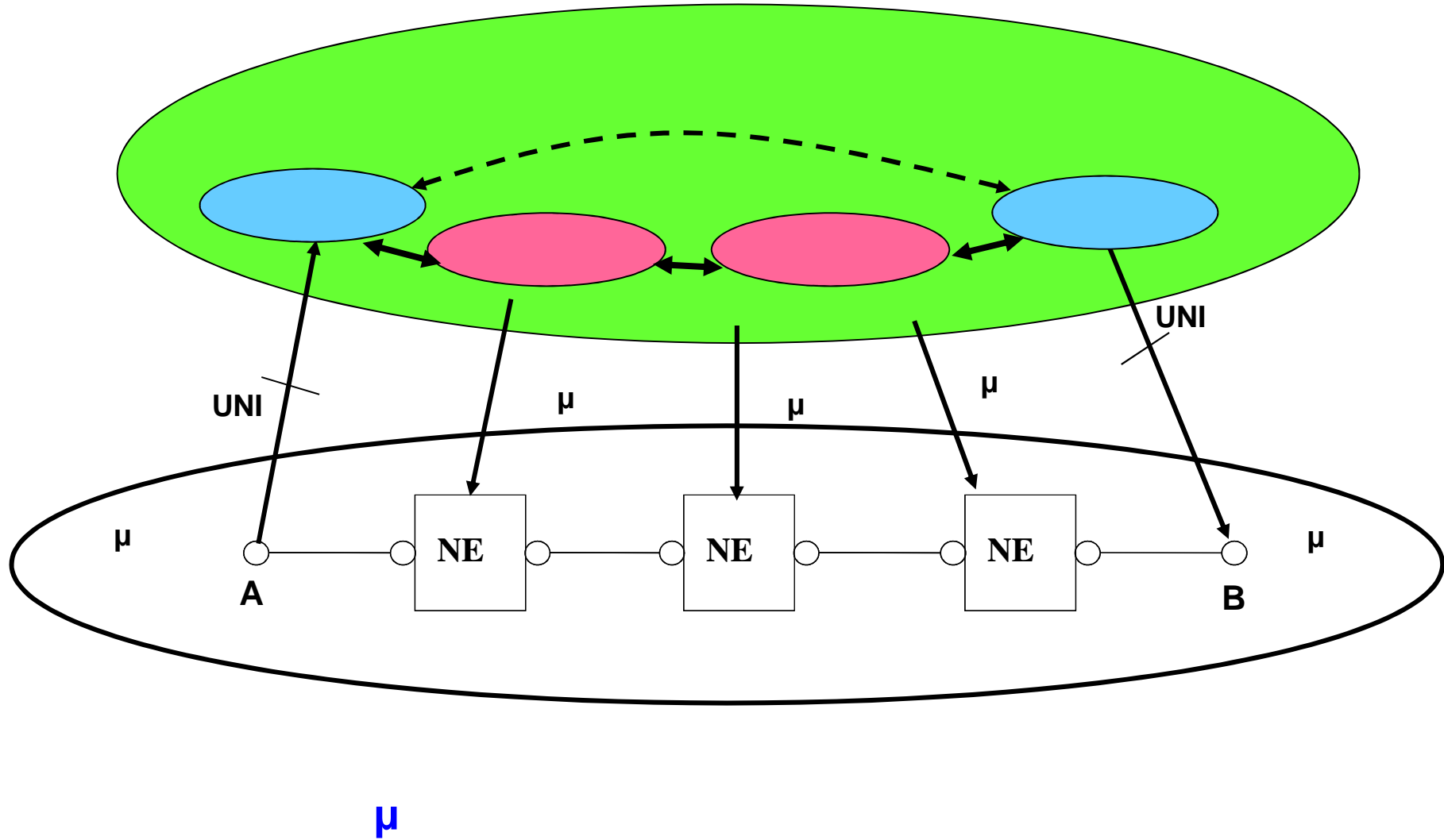
μ

—

μ



ASON Call/Connection Components





ASON+GFP+VCAT+LCAS

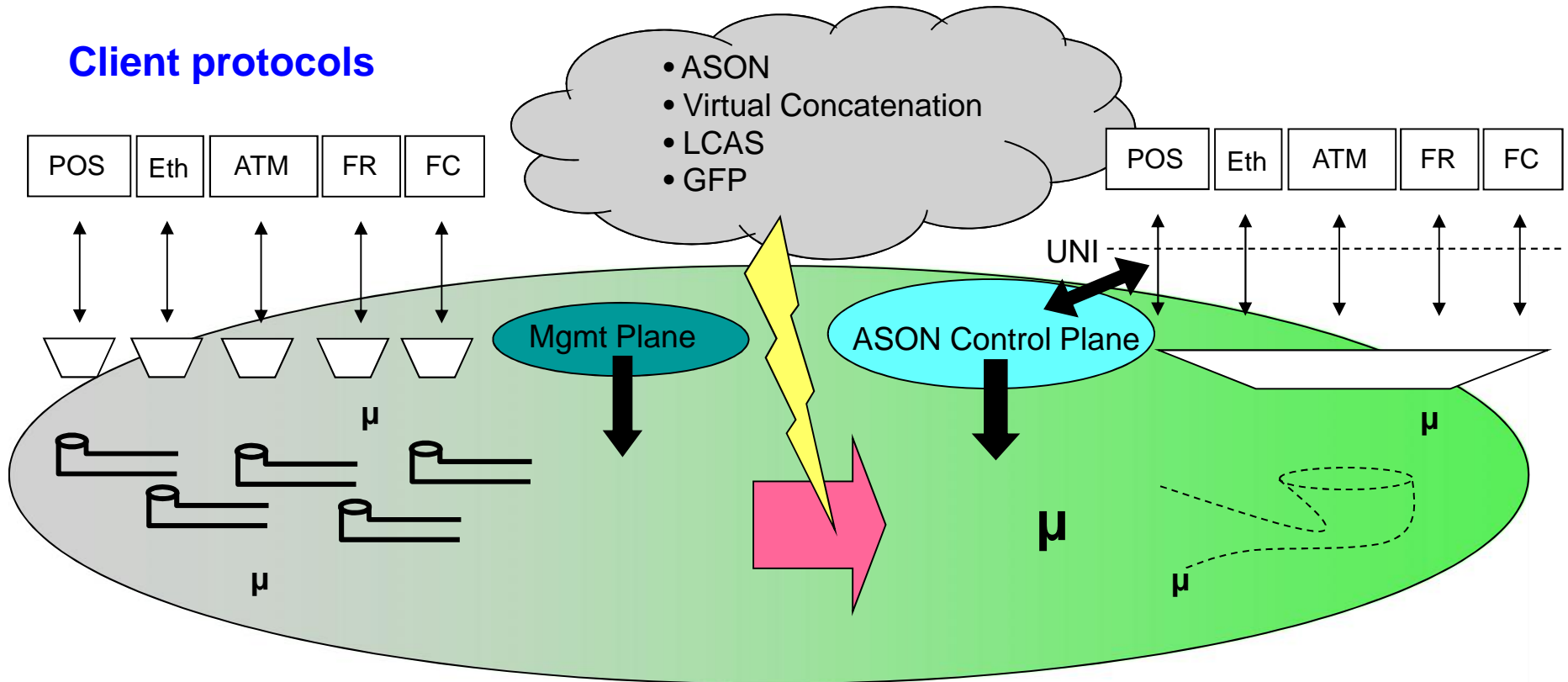


— μ μ μ
—
—
— :

□ ASON+VCAT+LCAS+GFP:

— μ
 μ
—
— μ

Client protocols





μ



μ

μ

μμ

μ μ

μ

-

μ
μ

μ

SONET/SDH

(OTN)

-

μμ

μ

μ μ)

(μ



μ

μ

-

μ , μ

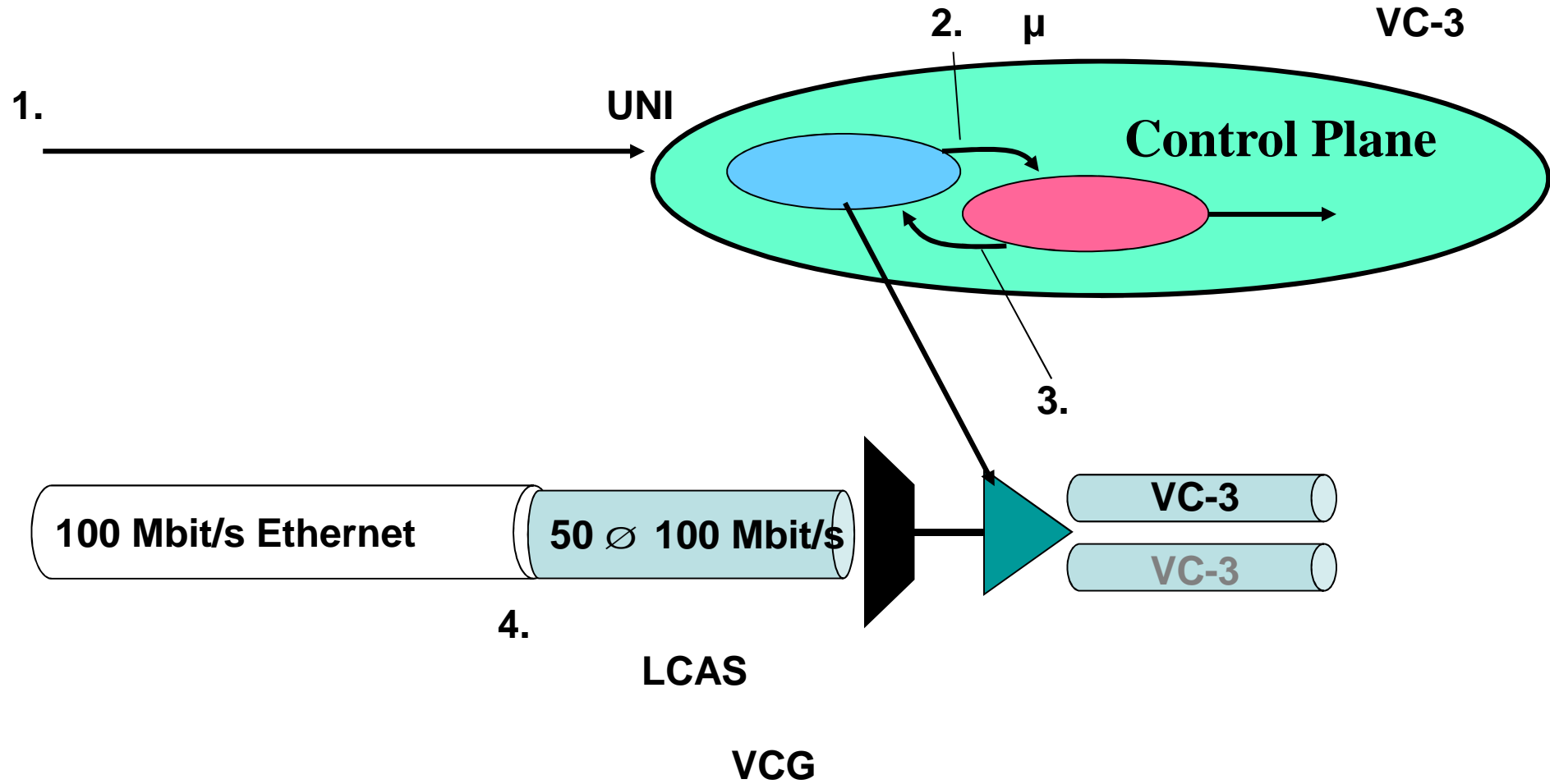
μ

μ virtual concatenation





μ : ASON+VCAT+LCAS+GFP





μ

μμ

Ethernet



μ

μ

ASON

— MAC
μ UNI μ

ASON
μ Ethernet.

— bit rate μ
μ

μ
μ

Ethernet.

— μ
μ μ

bit rate.

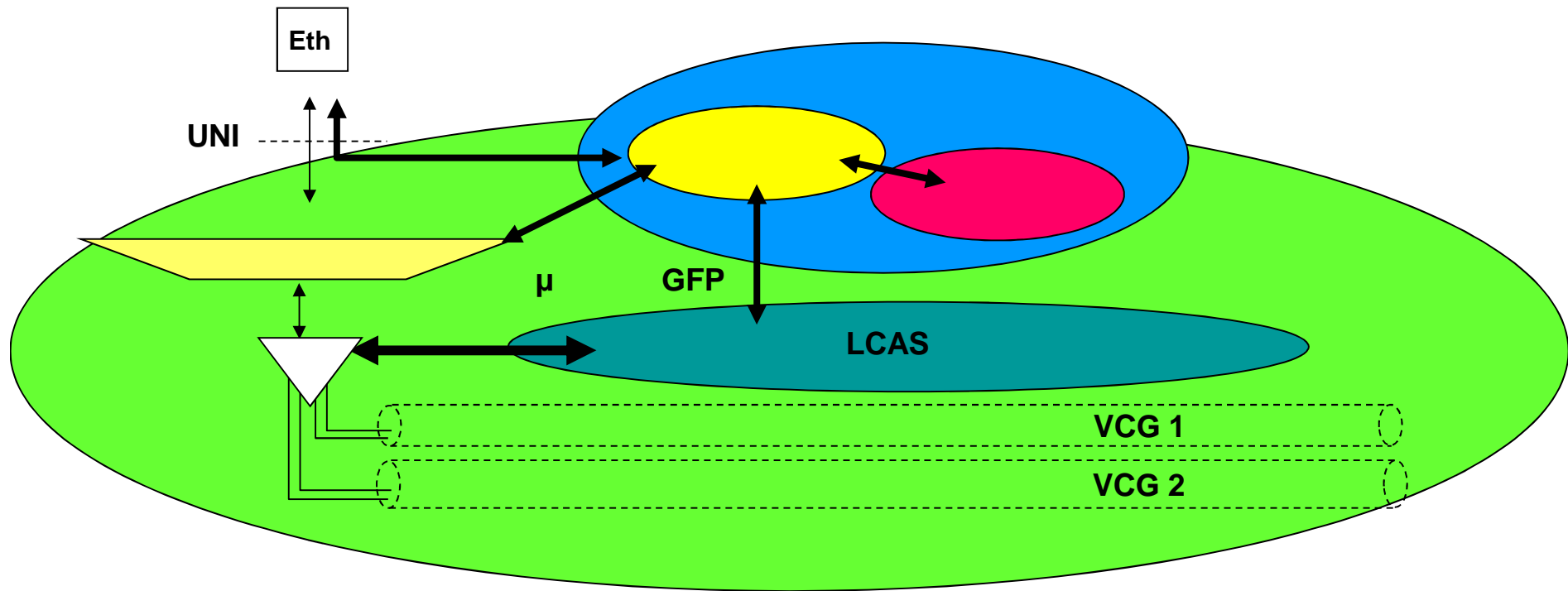
— bit rate μ

.



μ :

$\mu\mu$
Ethernet





μ

μ

□ VCAT+LCAS+GFP = μ μ

□ VCAT+LCAS+GFP

□ VC +LCAS+GFP ASON μ μ

-

-

μ

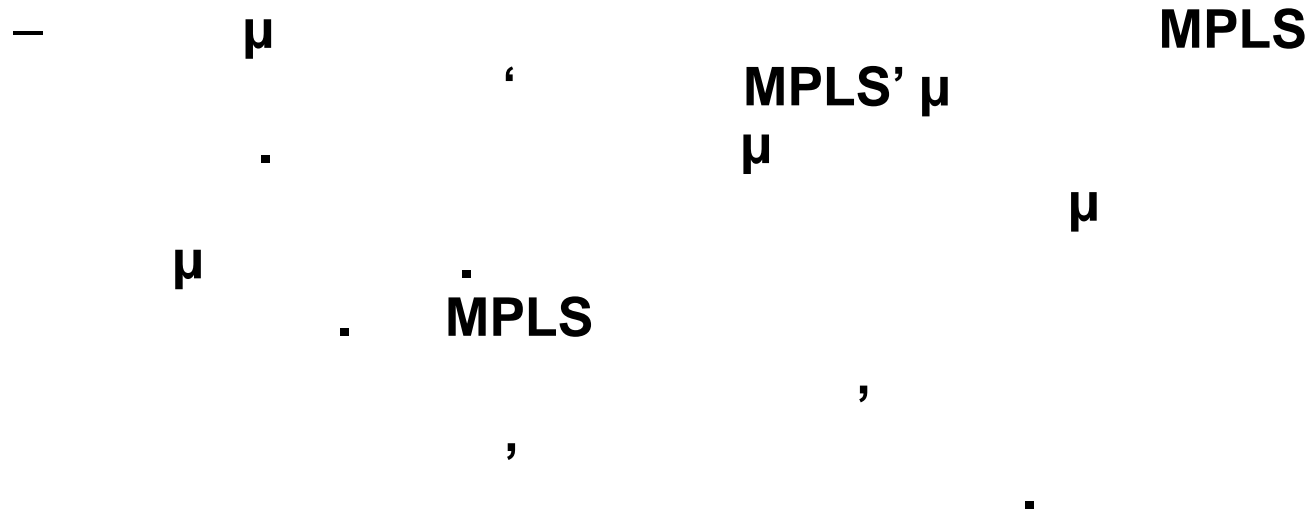
-

.

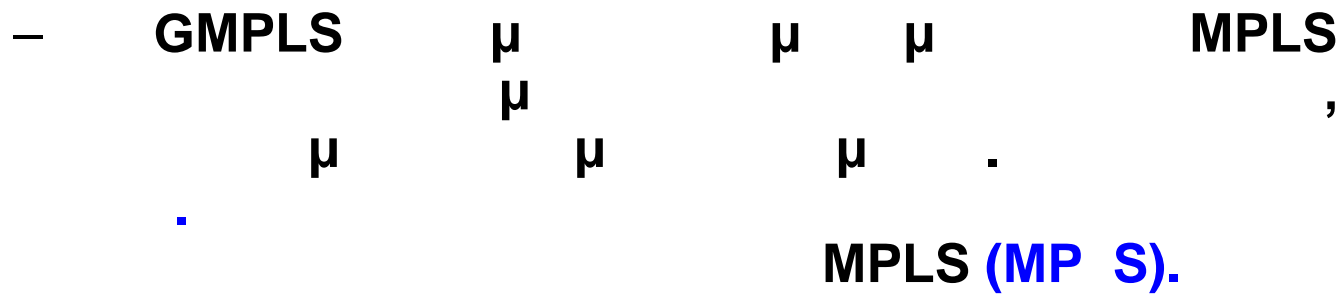


MPLS-GMPLS

□ Multi-Protocol Label Switching



□ Generalized Multi-Protocol Label Switching





μ

μ

μ
MP S

