



Case Study: An ISP IPv6 Addressing Plan

Yannis Nikolopoulos
yanodd@otenet.gr

Qualities of an (IPv6) Addressing Plan

- ▶ Future-proof
- ▶ Scalable
- ▶ Sparing
- ▶ Consistent
- ▶ Produce easily aggregatable space
- ▶ (security) Policy implementation should be made easy

Qualities of an (IPv6) Addressing Plan

- ▶ Future-proof
- ▶ Scalable
- ▶ Sparing
- ▶ Consistent
- ▶ Produce easily aggregatable space
- ▶ (security) Policy implementation should be made easy
- ▶ Simple

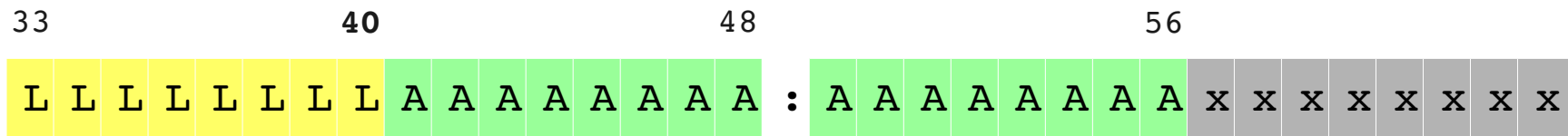
Laying Some Ground Rules

- ▶ /29 allocation
- ▶ Customers to get at least a /56 (except maybe in case of mobile)
- ▶ No prefixes larger than /64 (special cases may arise)

Structure – Incorporating Aspects

- ▶ **Location:** City/PoP or terminating device (BRAS/BNG)
- ▶ **Service:** internet access, VoIP, TV etc (QOS-friendly)
- ▶ **Traffic Type:** trusted vs non-trusted

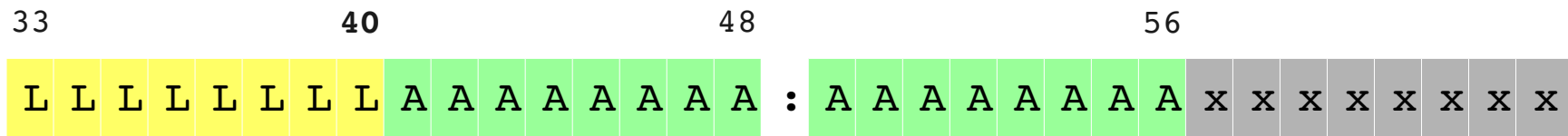
Incorporating Aspects - Location



L: Location
A: Assignable

Incorporating Aspects - Location

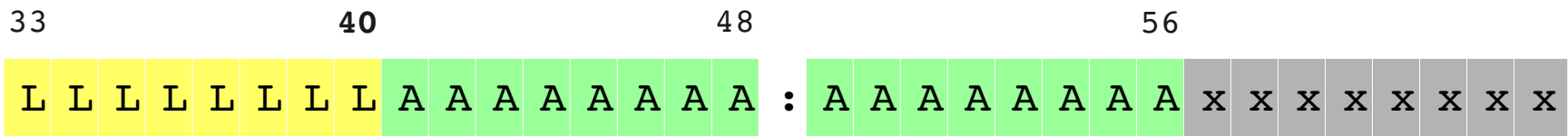
8 bits allowing for 256 locations



L: Location
A: Assignable

Incorporating Aspects - Location

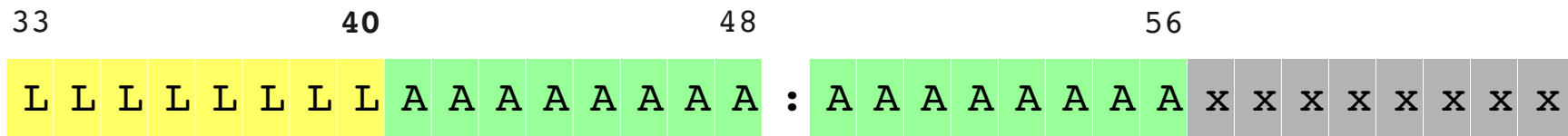
8 bits allowing for 256 locations



L: Location
A: Assignable

65k /56 per location
(16 bits)

Incorporating Aspects - Location



/56 subnet looks like:

2a02:0585:LLAA:AAxx::/56

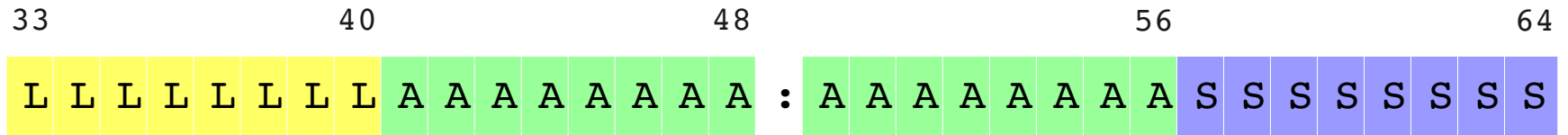
Example:

Athens:**22** (00010110)

2a02:585:2200::/40

L: Location
A: Assignable

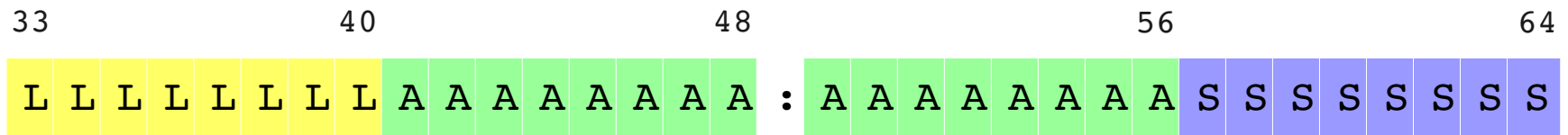
Incorporating Aspects - Service



L: Location
A: Assignable
S: Service

Incorporating Aspects - Service

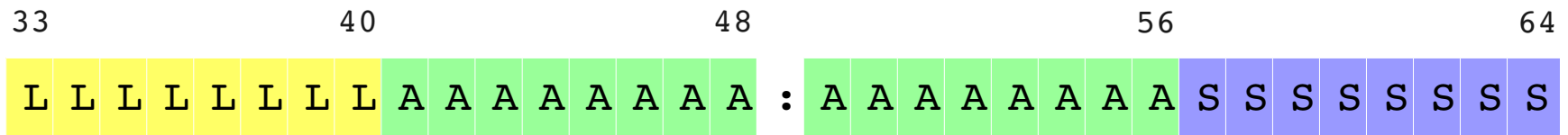
8 bits allowing for 256 services



L: Location
A: Assignable
S: Service

Incorporating Aspects - Service

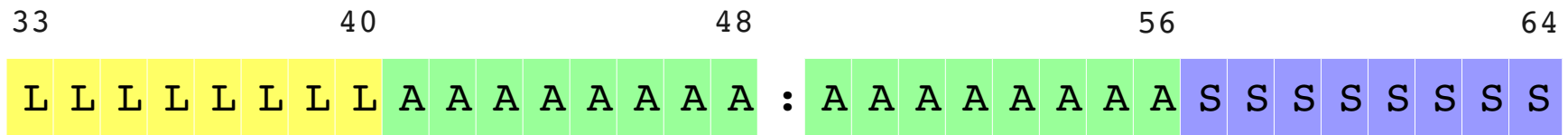
8 bits allowing for
256 services



L: Location
A: Assignable
S: Service

Multiple /64s
per service possible
(CPE customization)

Incorporating Aspects - Service



/64 subnet looks like:

2a02:0585:LLAA:AASS::/64

Example:

Internet access:**01** (00000001)

2a02:585:22xx:xx01::/64

L: Location
A: Assignable
S: Service

Incorporating Aspects – Traffic Type



T: Traffic Type
L: Location
A: Assignable
S: Service

Incorporating Aspects – Traffic Type

- Split /29 into multiple /32
- Use one /32 for infrastructure
- Use many /32 for customers



T: Traffic Type
L: Location
A: Assignable
S: Service

Incorporating Aspects – Traffic Type

- Split /29 into multiple /32
- Use one /32 for infrastructure
- Use many /32 for customers



Differentiate between **Trusted** and **non-Trusted**

Example:

2a02:0587::/32 Trusted

2a02:0580::/30 non-Trusted

2a02:0584::/31 non-Trusted

2a02:0586::/32 non-Trusted

T: Traffic Type
L: Location
A: Assignable
S: Service

Incorporating Aspects – Traffic Type



subnet looks like:
2a02:058T:LLAA:AASS::

- T: Traffic Type
- L: Location
- A: Assignable
- S: Service

Addressing Categories

- ▶ Customers' WANs
- ▶ Customers' LANs
- ▶ P-t-P Links
- ▶ Loopbacks
- ▶ VLANs

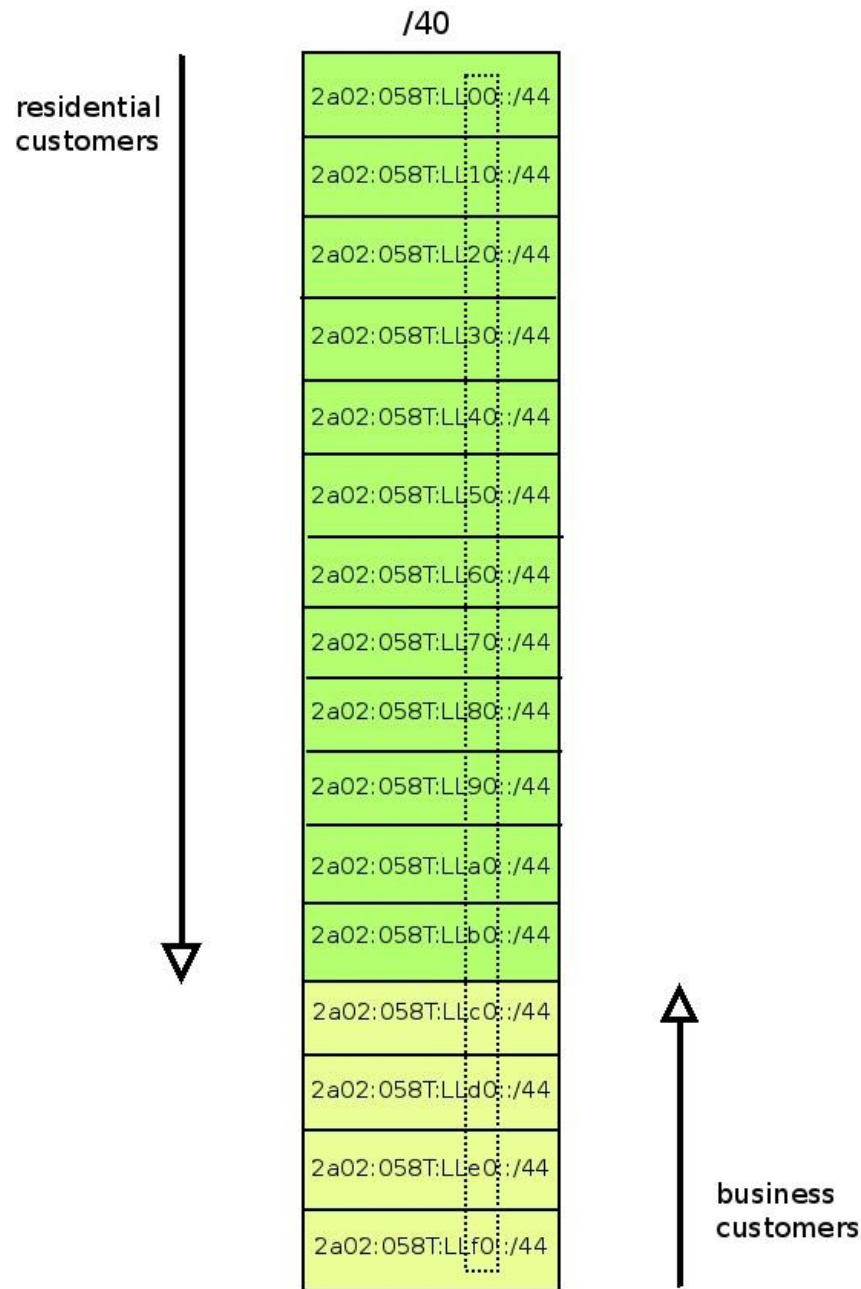
Addressing Categories – Users WANs

- ▶ Single IPv6 address (/128)
- ▶ Single /64 (or /56) for each BNG/BRAS

Addressing Categories – Customers LANs

- ▶ /56 Minimum
- ▶ Up to Multiple /48s (w/ basic justification)

Addressing Categories – Customers LANs



Addressing Categories – Point-to-Point Links

- ▶ Use /127 (rfc6164) from /64
- ▶ A couple of /48s off a /40 (special location)

Addressing Categories – Point-to-Point Links

- ▶ Use /127 (rfc6164) from /64
- ▶ A couple of /48s off a /40 (special location)

Example: Reserve location “**de**” and use “**deaf**” and “**dead**”

2a02:585:deaf::/48

2a02:585:dead::/48

Addressing Categories – Loopbacks

- ▶ /128 per loopback address
- ▶ Use special location (e.g. “ff”)
- ▶ Easy to differentiate between trusted/non-trusted

Addressing Categories – Infrastructure (V)LANs

- ▶ Incorporate VLAN ID
- ▶ Use the simplest way possible

Addressing Categories – Infrastructure (V)LANs

- ▶ Incorporate VLAN ID
- ▶ Use the simplest way possible

VLAN id	IPv6 subnet
810	2a02:585:100: 810 ::/64
35	2a02:585:100: 35 ::/64

Thank You :)

Questions?