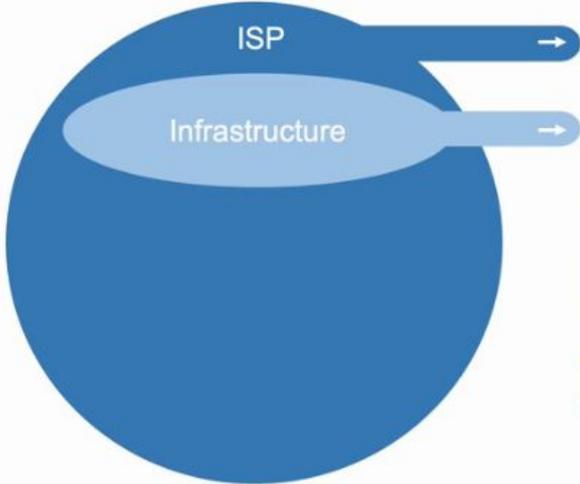


# ISP IPv6 Address Planning Structure

ISP Address Plan Structure



The diagram shows a large blue circle labeled 'ISP' containing a smaller light blue oval labeled 'Infrastructure'. Two arrows point from the 'ISP' circle to the right, leading to two text boxes. The top arrow points to a box describing IPv6 address allocation from RIR or NIR. The bottom arrow points to a box describing infrastructure address assignment. Below these boxes is a table with four rows: Infrastructure, Loopback, Point-to-Point, and Server LAN. The 'Server LAN' row is highlighted with an orange border.

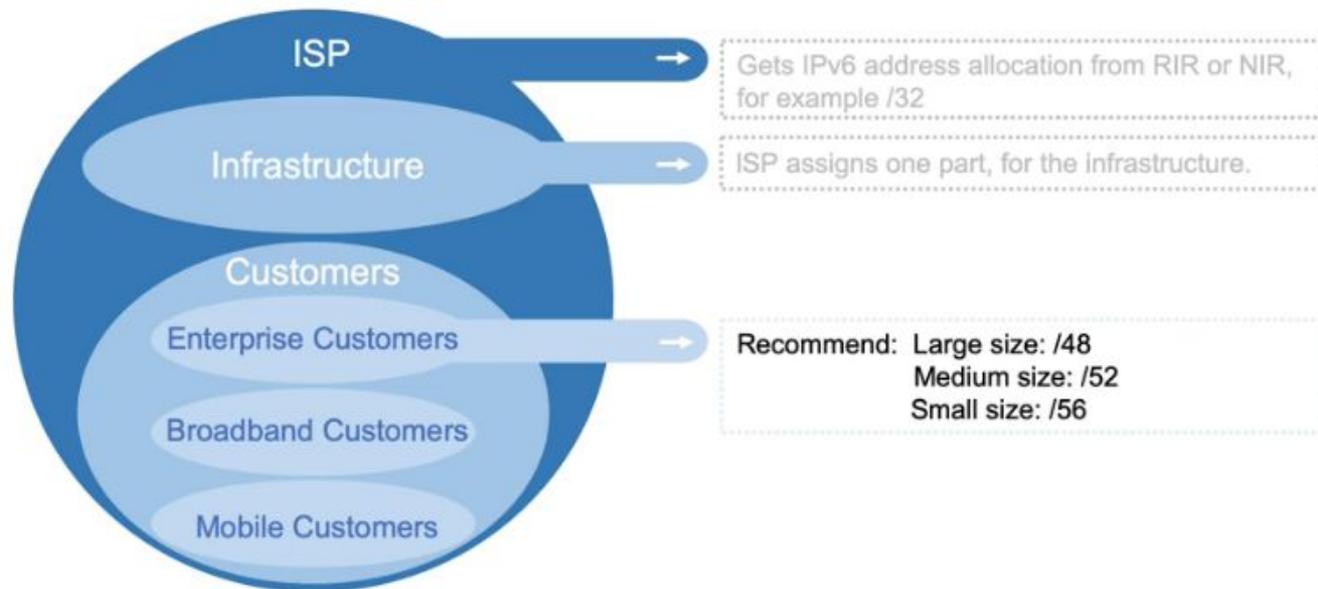
Gets IPv6 address allocation from RIR or NIR, for example /32

ISP assigns one part, for the infrastructure, including Loopback addresses, Point-to-Point Links, Server LANs.

Infrastructure	One /48 or /44 or /40
Loopback	One /64 is enough for all, each is /128
Point-to-Point	Recommend: each link occupies a /64, configure /127
Server LAN	One /64 is enough for one LAN

1:34

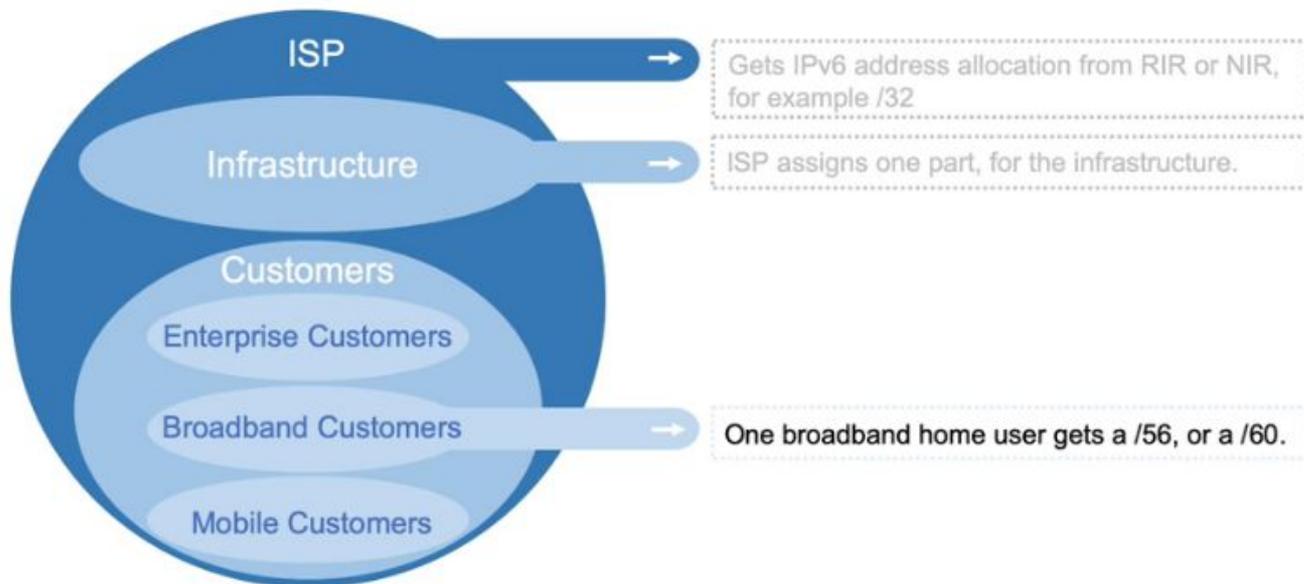
# ISP Address Plan Structure



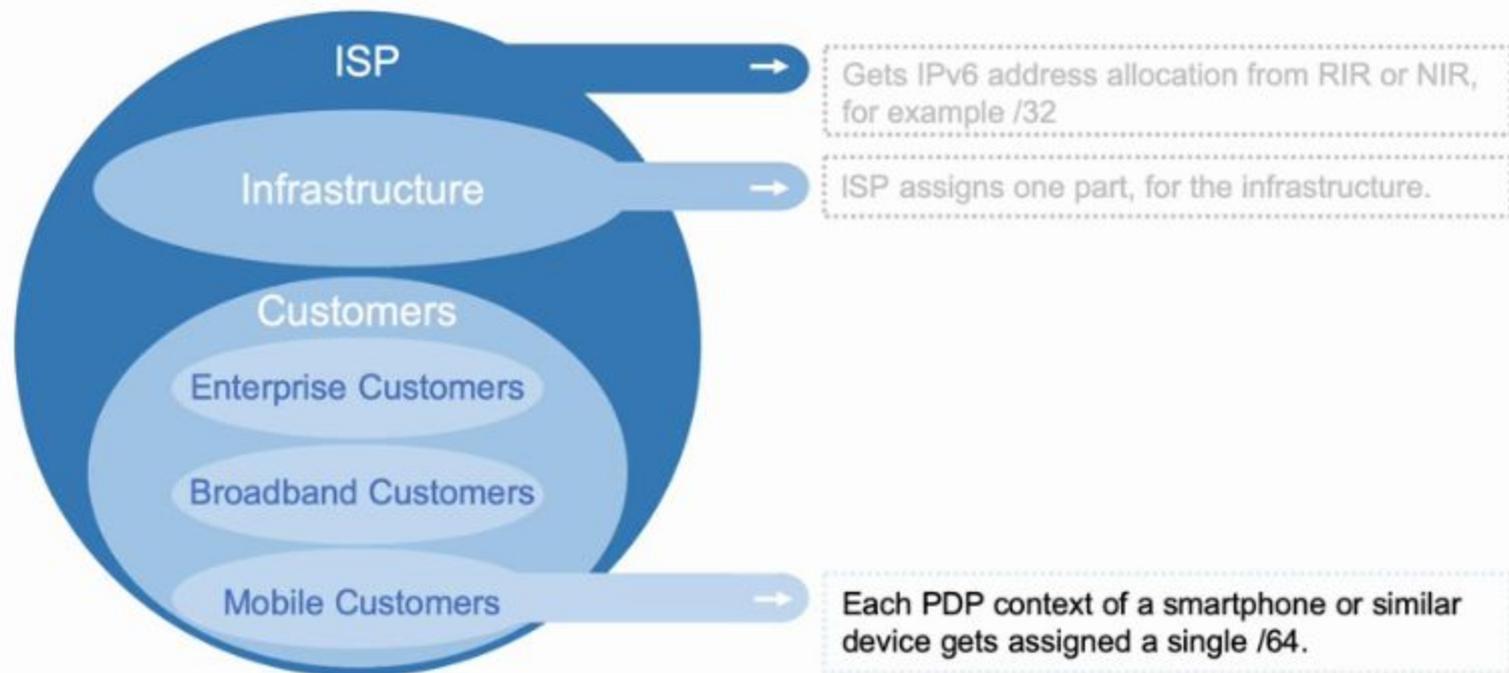
2:05



# ISP Address Plan Structure



# ISP Address Plan Structure





# ISP IPv6 Address Allocation



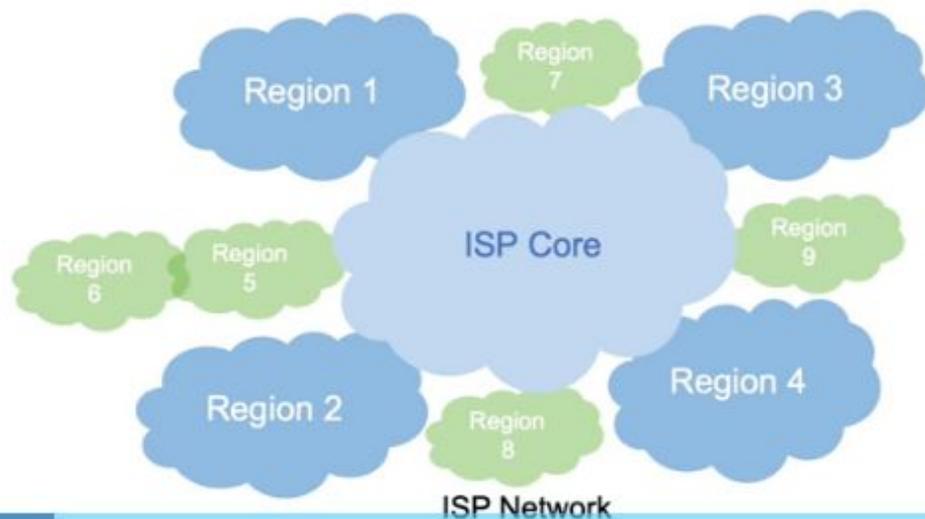
- For example, the ISP has been allocated 2001:db8::/32 by the RIR.



# IPv6 Address Plan: ISP Regions



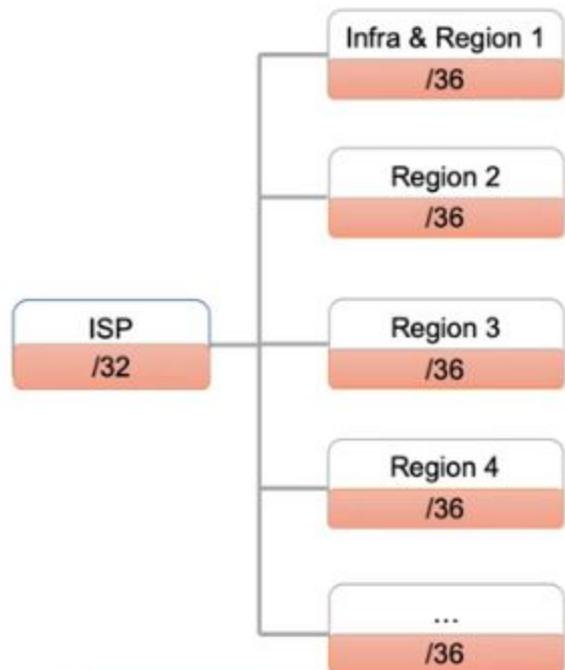
- This example ISP network has 4 regions currently, but there are plans to expand to 9 regions in future years. The network will use a 4-bit nibble for subnetting its regions.



**2001:db8:0000::/32**



# ISP IPv6 Address Distribution



# IPv6 Address Plan: ISP Regions



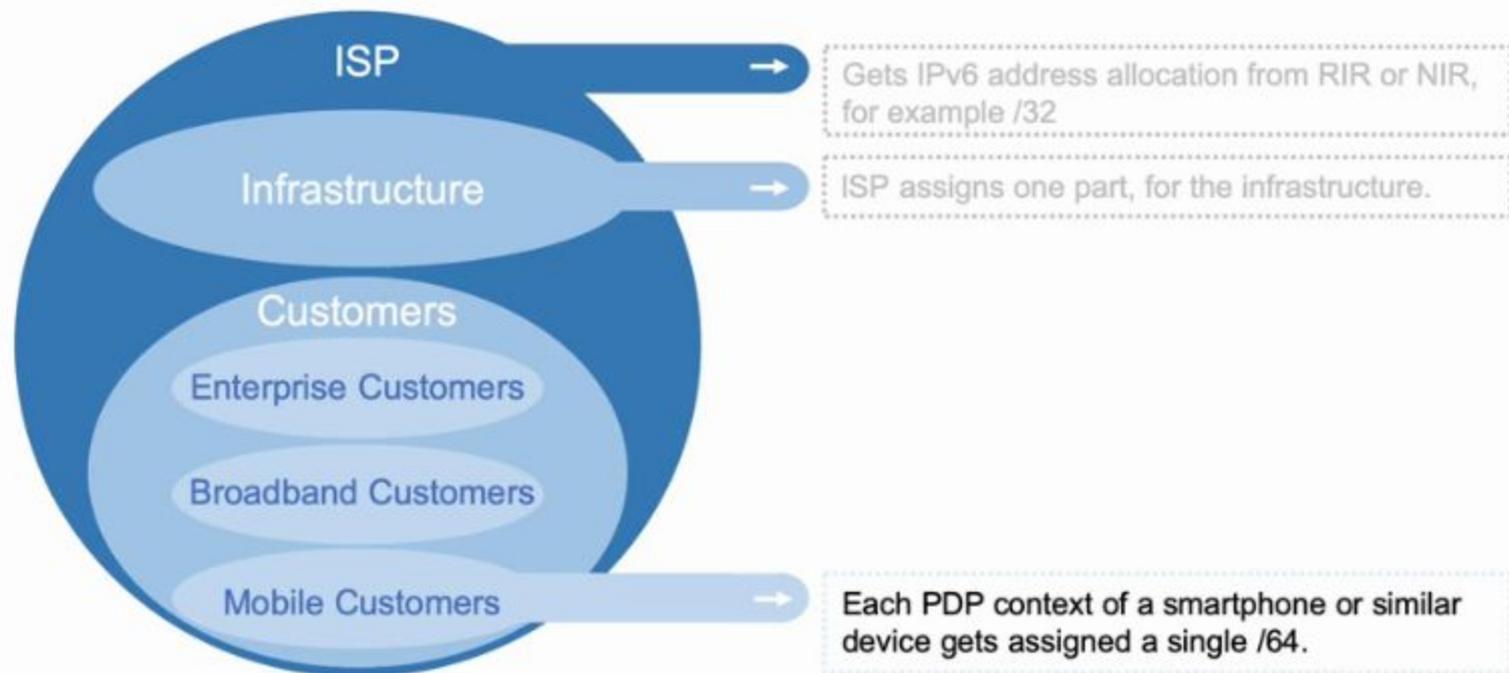
Function	Assigned IPv6 Address
<b>Infrastructure and Region 1 customers</b>	<b>2001:db8:0000::/36</b>
Reserved for future	2001:db8:1000::/36
Reserved for future	2001:db8:2000::/36
Reserved for future	2001:db8:3000::/36
<b>Region 3 customers</b>	<b>2001:db8:4000::/36</b>
Reserved for future	2001:db8:5000::/36
Reserved for future	2001:db8:6000::/36
Reserved for future	2001:db8:7000::/36
<b>Region 2 customers</b>	<b>2001:db8:8000::/36</b>
Reserved for future	2001:db8:9000::/36
Reserved for future	2001:db8:a000::/36
Reserved for future	2001:db8:b000::/36
<b>Region 4 customers</b>	<b>2001:db8:c000::/36</b>
Reserved for future	2001:db8:d000::/36
Reserved for future	2001:db8:e000::/36
Reserved for future	2001:db8:f000::/36



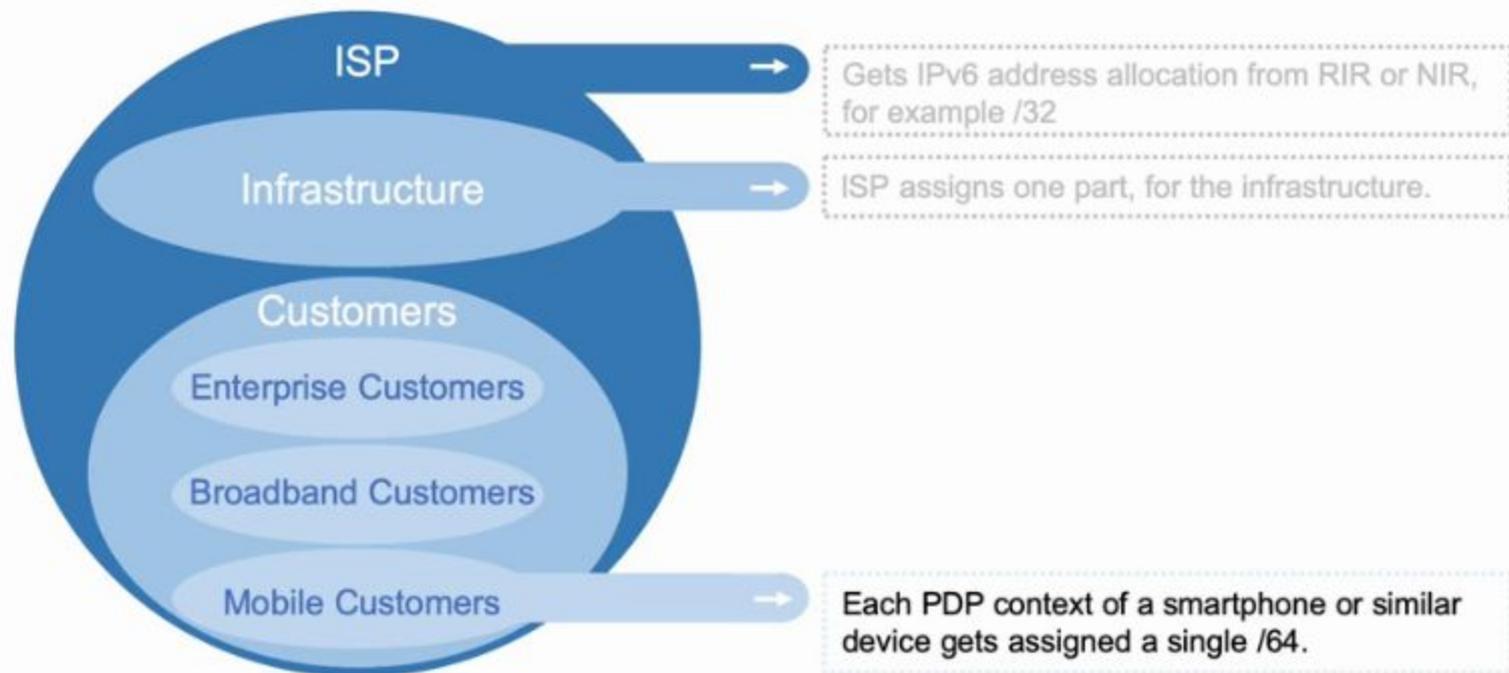
1:46



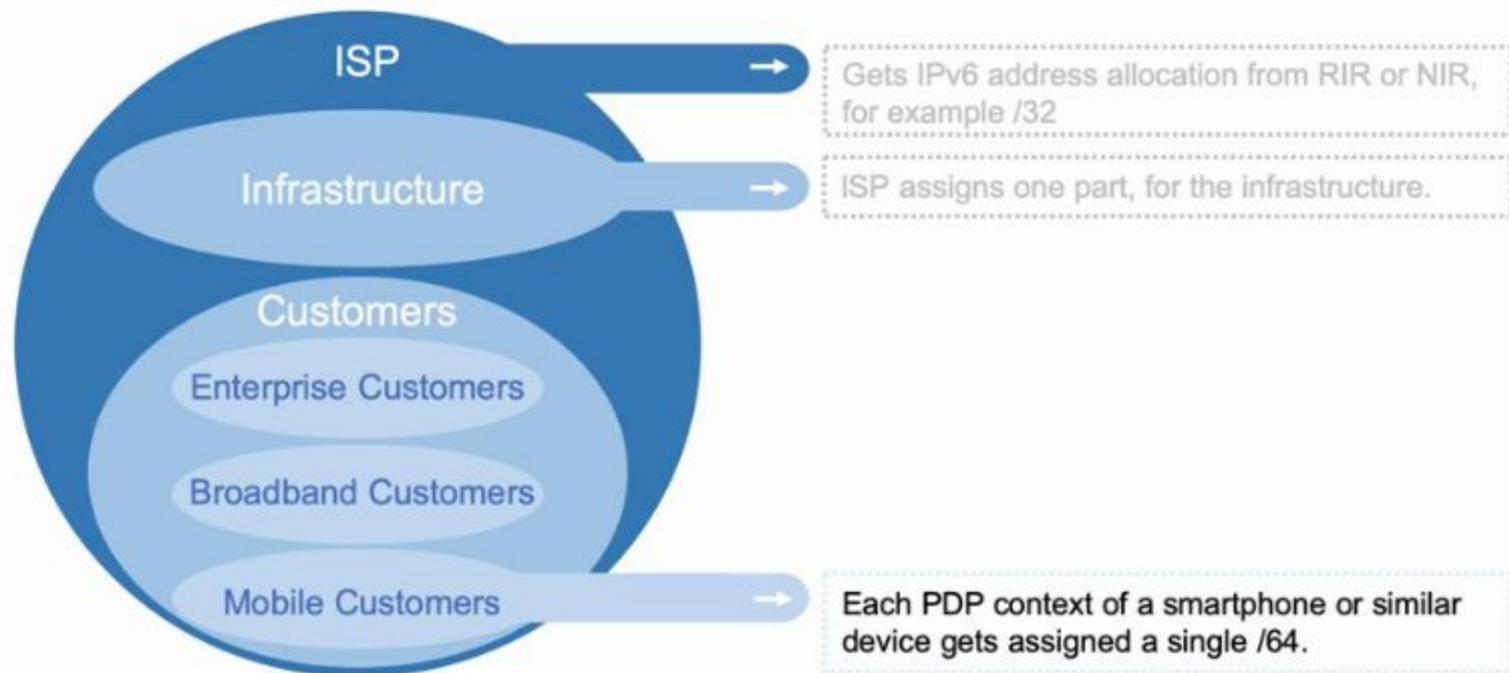
# ISP Address Plan Structure



# ISP Address Plan Structure



# ISP Address Plan Structure



# Topic 1.4: Address Allocation Methods

Topic Progress: ● ● ● ●

[← Back to Module](#)

## Example of Sequential Allocation Method



- Here is an example of how an ISP may distribute IPv6 address blocks to its regions using the sequential allocation method.

The ISP is allocating 2001:db8::/32 prefix to multiple regions; each region has a /40.

Regions	IPv6 Address Block
Region 1	2001:db8:0000::/40
Region 2	2001:db8:0100::/40
Region 3	2001:db8:0200::/40
Region 4	2001:db8:0300::/40
Region 5	2001:db8:0400::/40
...	...

# Topic 1.4: Address Allocation Methods

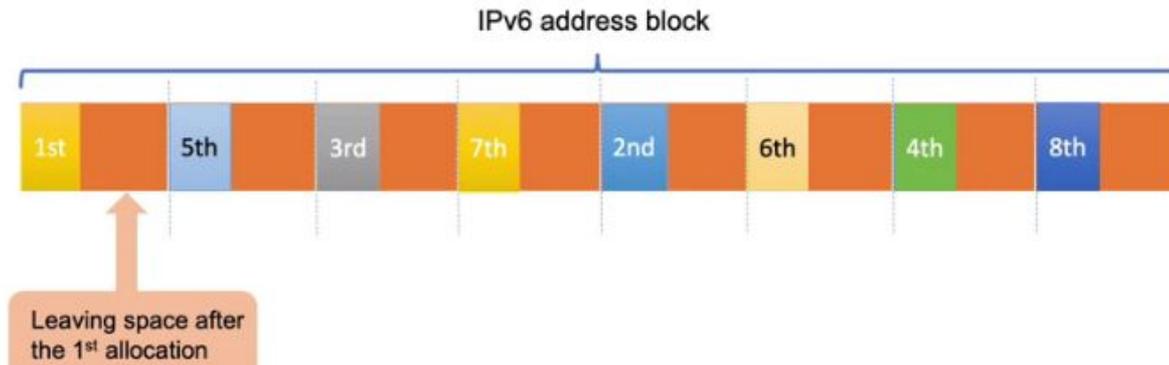
Topic Progress: ● ● ● ●

[← Back to Module](#)

## Sparse Allocation Method



- Sparse allocation method is about leaving a lot of space in between address allocations.
- The effect of the sparse allocation method is to create assignments that are spaced apart from one another, ensuring assignments can grow as needed while maintaining route aggregation.



# Topic 1.4: Address Allocation Methods

Topic Progress: ● ● ● ●

[← Back to Module](#)

The screenshot shows the APNIC Resource Manager website. The header includes the APNIC logo, navigation links for 'ADVANCED WHOIS', 'MAKE A PAYMENT', and a 'Member Account' dropdown menu. The main content area is titled 'Resource Manager' and features a 'Back to MyAPNIC Dashboard' button. A navigation menu includes 'Home', 'Resources', 'Admin', 'Contact', 'Tools', 'Events', and 'Member Accounts'. The current page is 'IPv6 Sparse Assignment', with a breadcrumb trail 'Home / Tools / IPv6 Sparse Assignment'. The page title is 'IPv6 Sparse Assignment'. The introductory text states: 'The IPv6 Sparse Assignment tool enables you to create assignments that are spaced apart from one another, ensuring assignments can grow as needed while maintaining route aggregation. Enter an IPv6 address of a block where the assignments will come from (beginning address & prefix length), number of assignments you need to make, and the minimum size of the assignment (optional)'. The form contains four input fields: 'Beginning address' (2001:db8::), 'Prefix length' (32), 'Number of assignments' (5), and 'Minimum assignment size' (40). A 'Submit' button is located at the bottom of the form. A vertical 'Feedback' button is on the right side of the page.

APNIC

ADVANCED WHOIS MAKE A PAYMENT Member Account APNIC TRAINING-AU

## Resource Manager

[Back to MyAPNIC Dashboard](#)

[Home](#) [Resources](#) [Admin](#) [Contact](#) [Tools](#) [Events](#) [Member Accounts](#)

[Home](#) / [Tools](#) / IPv6 Sparse Assignment

### IPv6 Sparse Assignment

The IPv6 Sparse Assignment tool enables you to create assignments that are spaced apart from one another, ensuring assignments can grow as needed while maintaining route aggregation.

Enter an IPv6 address of a block where the assignments will come from (beginning address & prefix length), number of assignments you need to make, and the minimum size of the assignment (optional).

Beginning address	<input type="text" value="2001:db8::"/>
Prefix length	<input type="text" value="32"/>
Number of assignments	<input type="text" value="5"/>
Minimum assignment size	<input type="text" value="40"/>

[Feedback](#)

# Topic 1.4: Address Allocation Methods

Topic Progress: ● ● ● ●

[← Back to Module](#)

## Example of Sparse Allocation Method



- Here is an example of how an ISP distributes IPv6 address blocks to its regions using the sparse allocation method.

The ISP will allocate 2001:db8::/32 prefix to multiple regions; each region has a /40.

Regions	IPv6 Address Block
Region 1	2001:db8:0000::/40
Region 2	2001:db8:8000::/40
Region 3	2001:db8:4000::/40
Region 4	2001:db8:c000::/40
Region 5	2001:db8:2000::/40
...	...

You can see the allocation is using the sparse allocation method.

# Topic 2.4: Nibble Boundary

Topic Progress: ● ● ● ●

[← Back to Module](#)

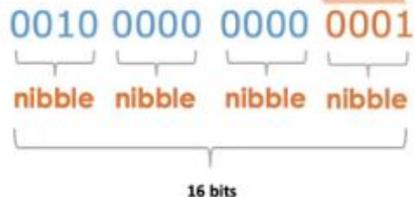
## Review of Nibble



### Components of an IPv6 address:

Example:

2001:0db8:0000:0000:0000:036e:1250:2b00



Dec	Hex	Binary
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
10	a	1010
11	b	1011
12	c	1100
13	d	1101
14	e	1110
15	f	1111

# Topic 2.4: Nibble Boundary

Topic Progress: ● ● ● ●

[← Back to Module](#)

## Subnet /32 into /36



2001:0db8:0000::/32

	2001:0db8:0000	0000::/32	2001:0db8:0000::/32
Subnet1	2001:0db8:0000	0000::/36	2001:0db8:0000::/36
Subnet2	2001:0db8:0001	0000::/36	2001:0db8:1000::/36
Subnet3	2001:0db8:0010	0000::/36	2001:0db8:2000::/36
Subnet4	2001:0db8:0011	0000::/36	2001:0db8:3000::/36
	...		...

In Binary

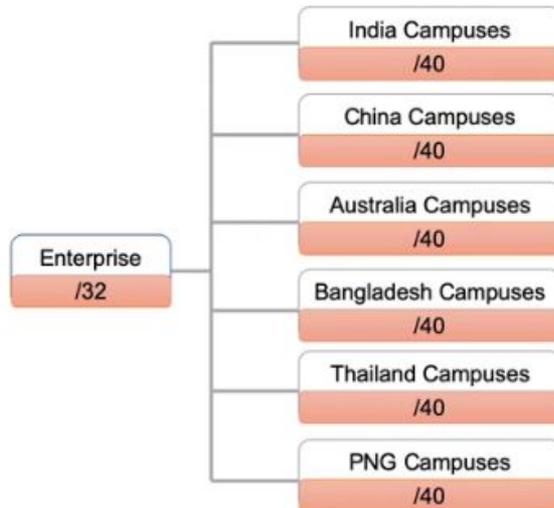
In Hex

# Topic 5.2: Enterprise Network IPv6 Address Planning Scenario

Topic Progress: ● ●

[← Back to Module](#)

## Enterprise Network IPv6 Address Distribution



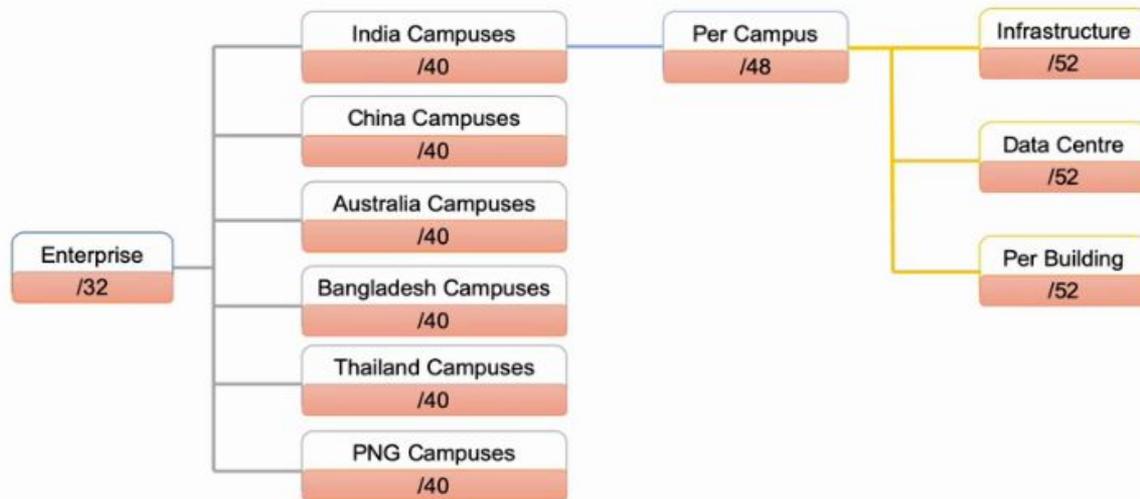
Function	Assigned IPv6 Address
Enterprise	2001:db8::/32
India Campuses	2001:db8:0000::/40
China Campuses	2001:db8:0100::/40
Australia Campuses	2001:db8:0200::/40
Bangladesh Campuses	2001:db8:0300::/40
Thailand Campuses	2001:db8:0400::/40
PNG Campuses	2001:db8:0500::/40
Reserved for future	2001:db8:0600::/40
...	...
	2001:db8:ff00::/40

# Topic 5.2: Enterprise Network IPv6 Address Planning Scenario

Topic Progress: ● ●

[← Back to Module](#)

## Enterprise Network IPv6 Address Distribution

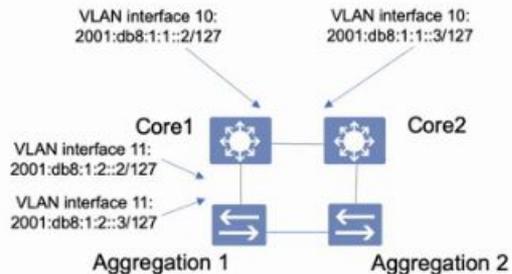


# Topic 5.2: Enterprise Network IPv6 Address Planning Scenario

Topic Progress: ● ●

← Back to Module

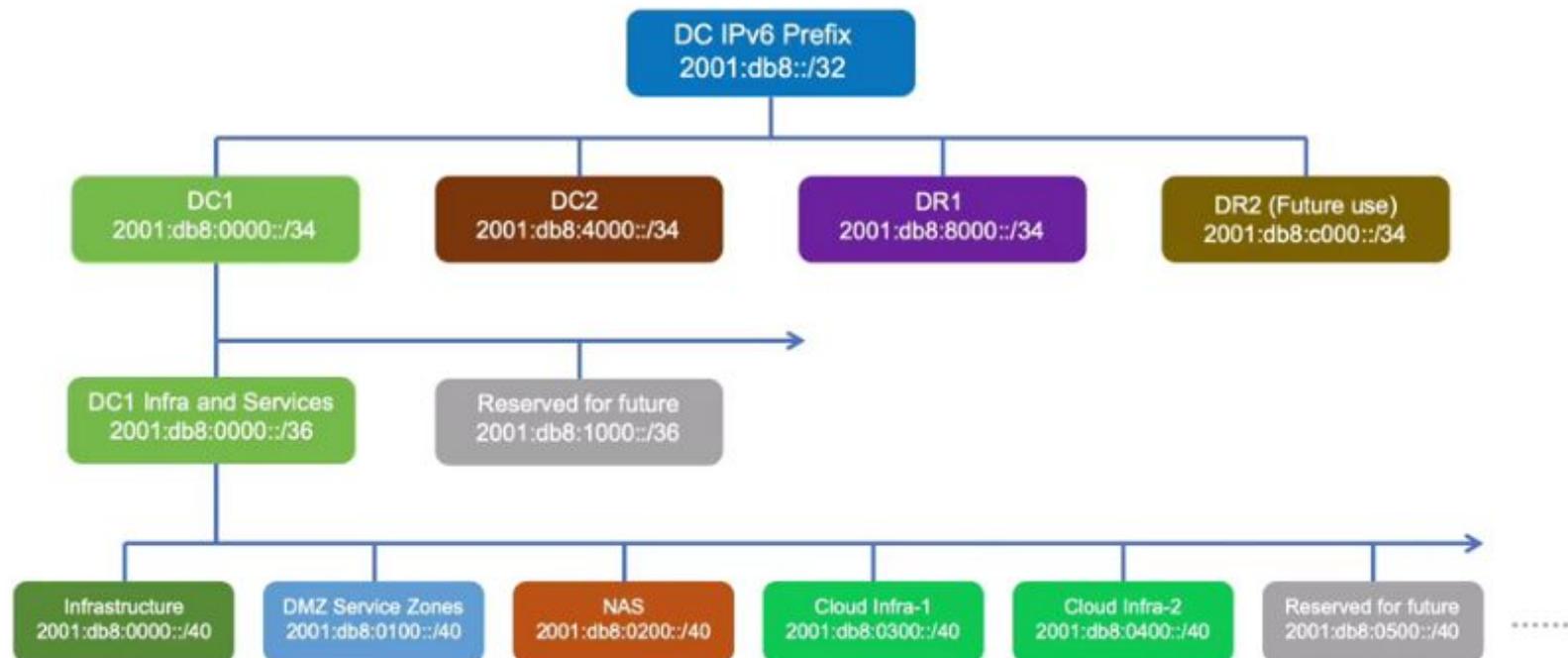
## IPv6 Address Plan: Point-to-Point Link



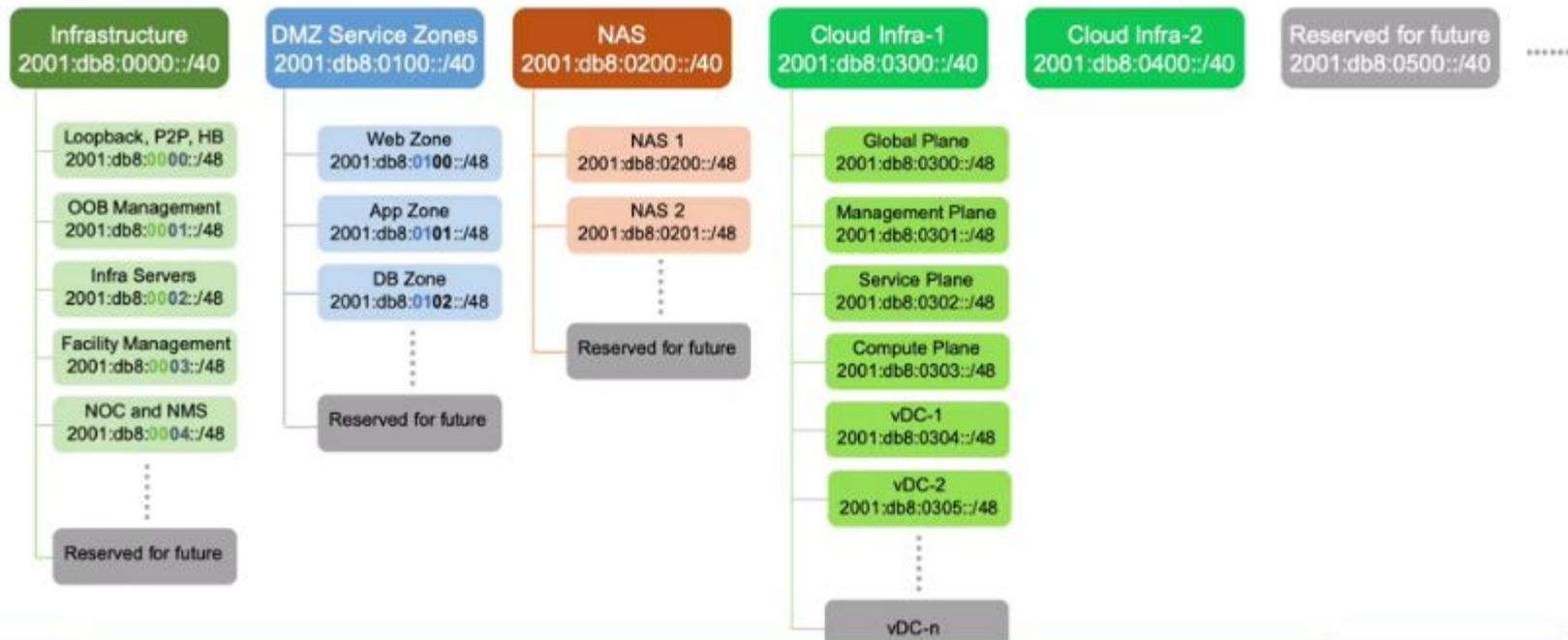
Function	Assigned IPv6 Address
India-Campus1	2001:db8:0001::/48
Infrastructure	2001:db8:0001:0000::/52
Loopback interfaces	2001:db8:0001:0000::/56
Point-to-Point links	2001:db8:0001:0100::/56
Reserved	2001:db8:0001:0100::/64
Core1-Core2 P-to-P link	2001:db8:0001:0101::/64
Core1 VLAN interface 10	2001:db8:0001:0101::2/127
Core2 VLAN interface 10	2001:db8:0001:0101::3/127
Core1-Agg1 P-to-P link	2001:db8:0001:0102::/64
Core1 VLAN interface 11	2001:db8:0001:0102::2/127
Agg1 VLAN interface 11	2001:db8:0001:0102::3/127
...	...
Network services	2001:db8:0001:0200::/56
Reserved for future	2001:db8:0001:0300::/56



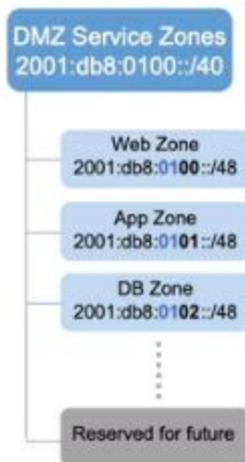
## IPv6 Address Structure: Enterprise DC



# IPv6 Address Plan for Data Centre



## IPv6 Address Plan: DMZ Service Zones



Component	Assigned IPv6 Address
DB Zone-1	2001:db8:0102:0000::/64
DB Zone-2	2001:db8:0102:0001::/64
DB Zone-3	2001:db8:0102:0002::/64
...	...

- DB Zone
  - Web and App may access the DB VMs
  - External access are not allowed

# Getting IPv6 Global Unicast Addresses



## RIR (Regional Internet Registry)



## NIR (National Internet Registry)



## LIR (Local Internet Registry)



LIR

Your upstream ISP

Your network