CCNA 200-301, Volume I

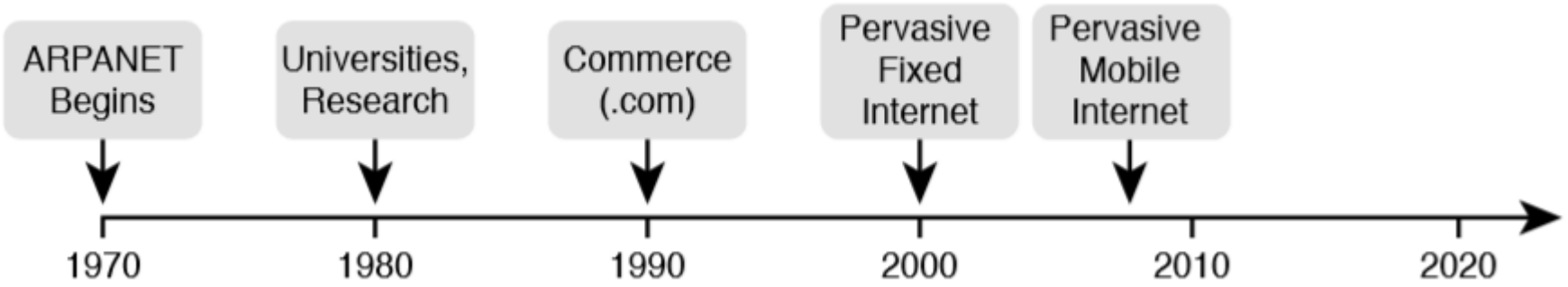
Chapter 22

Fundamentals of IP Version 6

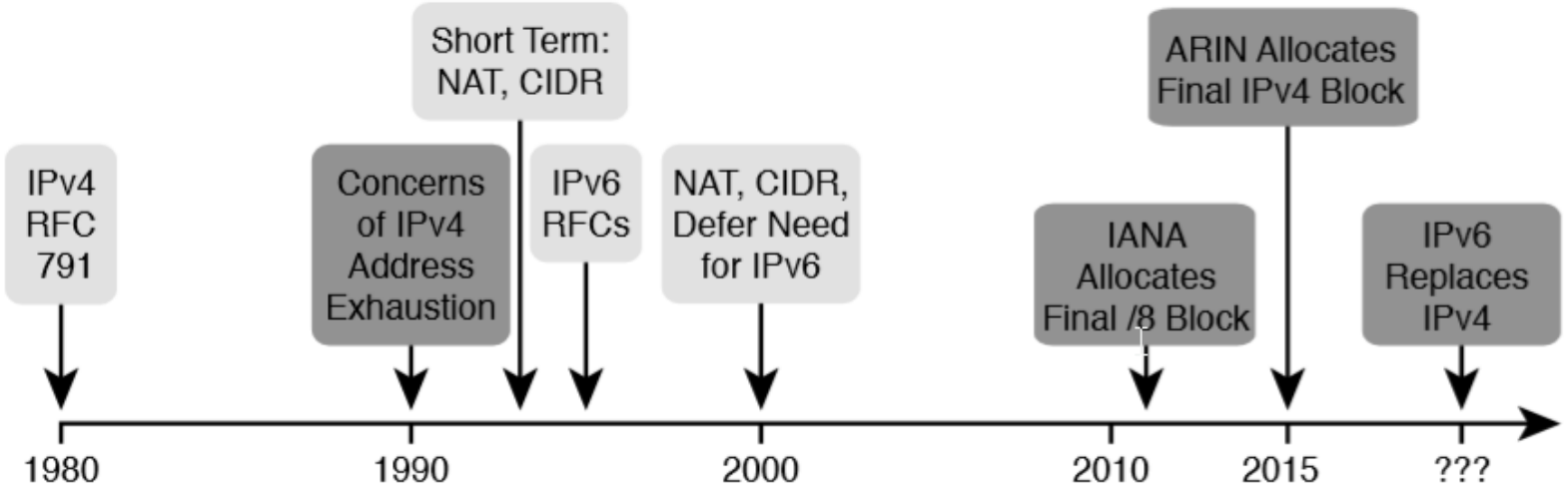
Objectives

- Introduction to IPv6
- IPv6 Addressing Formats and Conventions

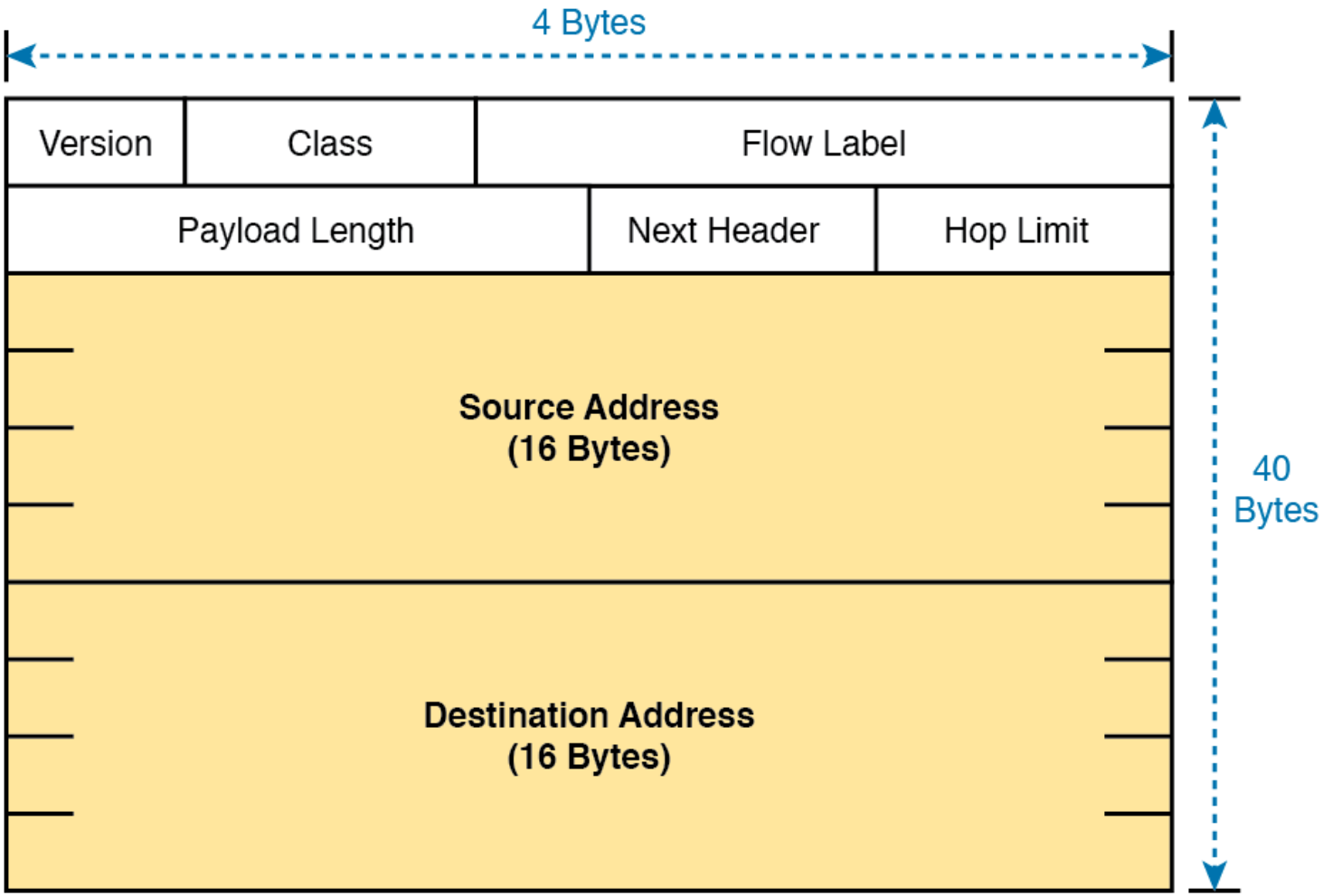
Some Major Events in the Growth of the Internet



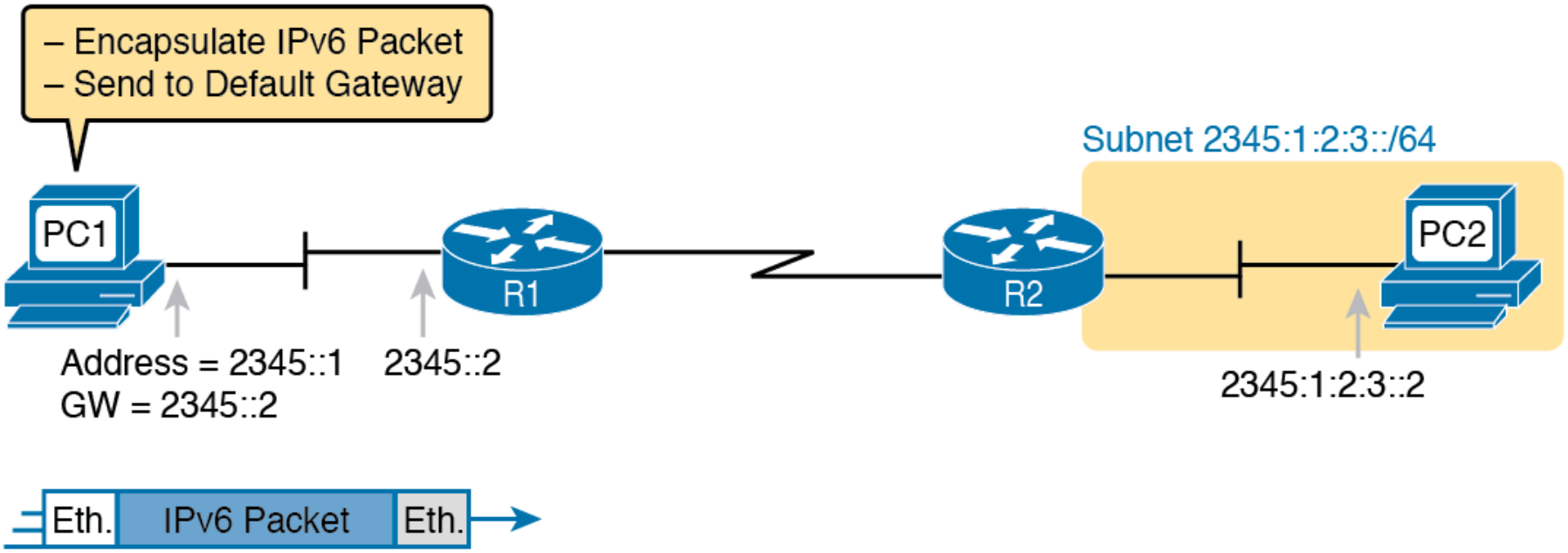
Timeline for IPv4 Address Exhaustion and Short/Long Term Solutions



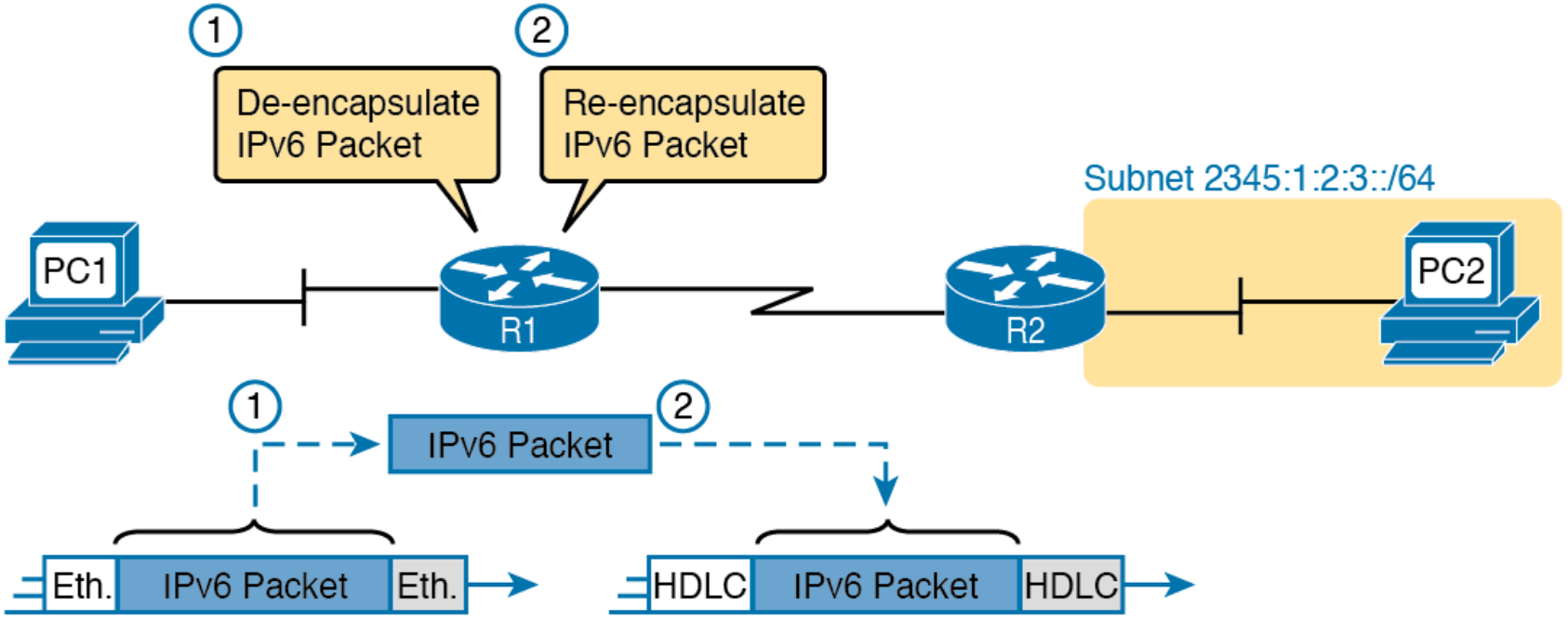
IPv6 Header


4 Bytes
Version
Class
Flow Label
Payload Length
Next Header
Hop Limit
Source Address
(16 Bytes)
Destination Address
(16 Bytes)
40
Bytes

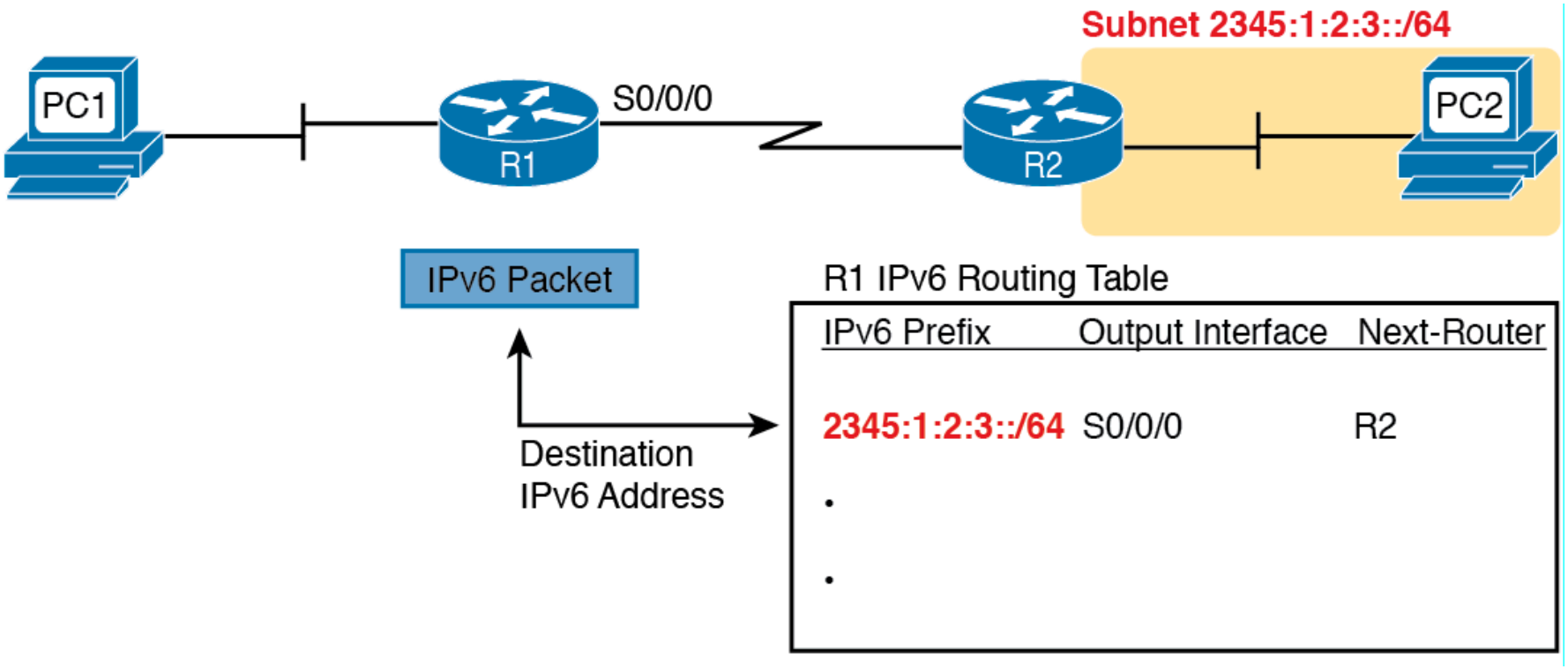
IPv6 Host Building and Sending an IPv6 Packet



IPv6 Router Performing Routine Encapsulation Tasks when Routing Ipv6



IPv6 Router Performing Routine Encapsulation Tasks when Routing IPv6



IPv6 Routing Protocols

Routing Protocol	Defined by	Description
RIPng (RIP Next Generation)	RFC	The “Next Generation” is a reference to a TV series, “Star Trek: the Next Generation”
OSPFv3 (OSPF Version 3)	RFC	The OSPF you have worked with for IPv4 is actually OSPF Version 2, as defined in RFC 2427
EIGRPv6 (EIGRP for IPv6)	Cisco	Cisco owns the rights to the EIGRP protocol; they just named it EIGRPv6 to look similar to “IPv6”
MP BGP-4 (Multiprotocol BGP Version 4)	RFC	BGP Version 4 was created to be highly extendable; IPv6 support was added to BGP Version 4 through one such enhancement, MP BGP-4.

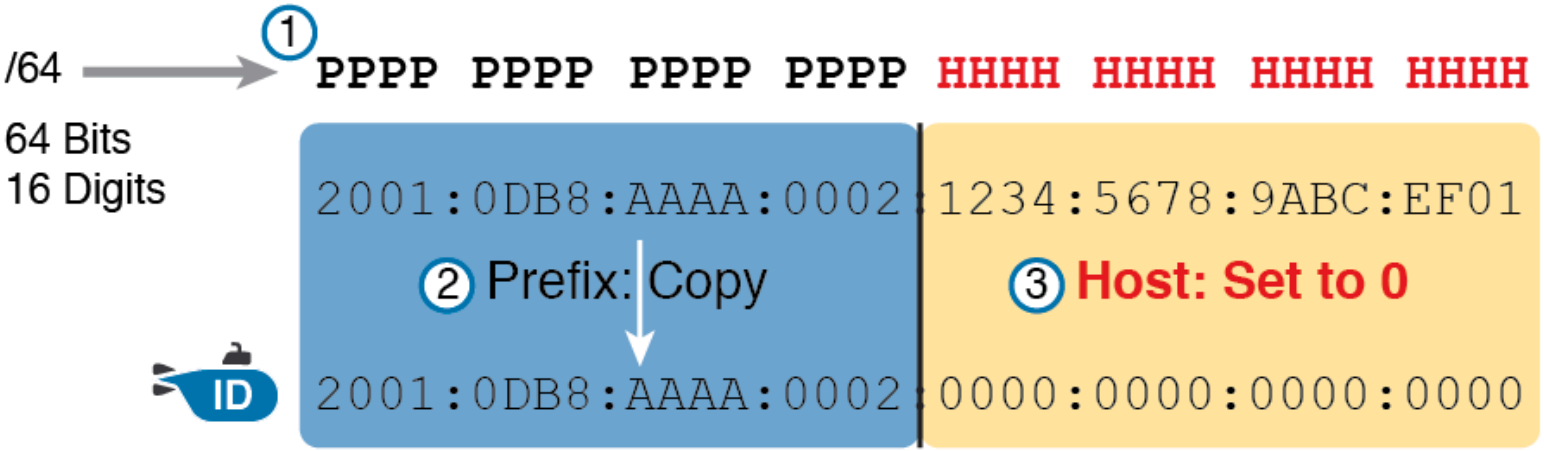
Hexadecimal/Binary Conversion Chart

Hex	Binary	Hex	Binary
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111

IPv6 Address Abbreviation and Expansion Practice

Full	Abbreviation
2340:0000:0010:0100:1000:ABCD:0101:1010	
	30A0:ABCD:EF12:3456:ABC:B0B0:9999:9009
2222:3333:4444:5555:0000:0000:6060:0707	
	3210::
210F:0000:0000:0000:CCCC:0000:0000:000D	
	34BA:B:B::20
FE80:0000:0000:0000:DEAD:BEFF:FEEF:CAFE	
	FE80::FACE:BAFF:FEBE:CAFE
FE80:000F:00E0:0D00:FACE:BAFF:FE00:0000	
	FE80:800:0:40:CAFE:FF:FE00:1

Creating the IPv6 Prefix from an Address/Length



Legend:

ID Subnet ID

Finding the IPv6 Prefix from an Address/Length Value

Address/Length	Prefix
2340:0:10:100:1000:ABCD:101:1010/64	
30A0:ABCD:EF12:3456:ABC:B0B0:9999:9009/64	
2222:3333:4444:5555::6060:707/64	
3210::ABCD:101:1010/64	

Address/Length	Prefix
210F::CCCC:B0B0:9999:9009/64	
34BA:B:B:0:5555:0:6060:707/64	
3124::DEAD:CAFE:FF:FE00:1/64	
2BCD::FACE:BEFF:FEBE:CAFE/64	

Working with More-Difficult IPv6 Prefix Lengths

Address/Length	Prefix
34BA:B:B:0:5555:0:6060:707/80	
3124::DEAD:CAFE:FF:FE00:1/80	
2BCD::FACE:BEFF:FEBE:CAFE/48	
3FED:F:E0:D00:FACE:BAFF:FE00:0/48	
210F:A:B:C:CCCC:B0B0:9999:9009/40	
34BA:B:B:0:5555:0:6060:707/36	
3124::DEAD:CAFE:FF:FE00:1/60	
2BCD::FACE:1:BEFF:FEBE:CAFE/56	