Basic Requirements for IPv6 Customer Edge Routers – Summary

Based on IETF Internet-Draft draft-winters-v6ops-rfc7084bis-03 (July 8, 2024)

Scope
This summary describes key points from the IETF IPv6 CE router draft.
It focuses on small-office and residential IPv6 Customer Edge (CE) routers
that connect an end-user network to a service provider network.

High-level goals
- Provide at least the same functionality as typical IPv4 home/office CPE,
  while enabling native IPv6 connectivity.
- Define a baseline feature set that vendors should implement so that
  CE routers behave consistently across different access networks.

Architecture overview
- The CE router sits between the service provider network (WAN) and one
  or more end-user LAN segments.
- It routes IPv6 traffic, provisions its WAN interface automatically,
  and advertises prefixes and configuration to LAN hosts.

Key requirement areas
1) General requirements
- Act as an IPv6 router according to IPv6 node requirements.
- Do not forward IPv6 traffic between WAN and LAN until basic
  address and prefix provisioning has completed.

2) WAN-side configuration
- Support stateless and/or stateful address configuration on the WAN
  (SLAAC and DHCPv6).
- Discover default routers using Neighbor Discovery and install default
  routes accordingly.
- Act as a DHCPv6 requesting router for prefix delegation and use a
  stable DHCP Unique Identifier (DUID).

3) LAN-side configuration
- Advertise prefixes to LAN hosts and support multiple LAN interfaces.
- Use Router Advertisements and DHCPv6 to provide addresses and
  configuration such as DNS servers.
- Use Unique Local Addresses (ULAs) where appropriate and keep ULA
  traffic inside the end-user network.

4) Security-related behavior
- Implement ICMPv6 correctly and avoid leaking ULA traffic to the WAN.
- Provide a default posture that does not create open exposure when the
  router has no valid IPv6 connectivity.

5) Prefix delegation
- Request delegated prefixes that are large enough to give at least one
  /64 per LAN segment, rounded to nibble boundaries.
- Be prepared to accept other prefix sizes and handle logging when the
  prefix is too small.

6) Operational considerations
- Support NTP via DHCPv6 options when implemented.
- Follow best practices for address generation (avoid EUI-64 based
  addresses and use privacy-friendly methods).

Usage note
This PDF is an informal summary for design and planning purposes.
It does not replace the official IETF text and may omit details.

Original draft: https://www.ietf.org/archive/id/draft-winters-v6ops-rfc7084bis-03.html