**Current Multicast:**
- **IP Multicast (IPMC)**
  - Performs well, but is not universally available.
- **Application Layer Multicast (ALM)**
  - Scales to the Internet, but suffers from high latency (Mesh) or network churn (Tree).

**No single solution covers all the benefits!**

**Solution**

**Quilt:** A patchwork of Multicast Regions where each runs a different protocol; with a Wide Area Overlay sewing them together.

**Goals:**
- Minimize delivery latency
- Minimize control overhead
- Resilient to node churn/failure
- Adapt to the runtime environment

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**Quilt: An Adaptive Multicast Infrastructure for WAN Networks**

**Problem**

**Approach**

1. **Detect environment**
   - New host
   - NIC-based Environment Unique Identifier (EUID)
   - Connectivity Options
     - NAT/Firewall settings
   - Local Topology
     - IPMC support, topography
   - Measured Performance
     - Bandwidth, latency, etc.

2. **Join with EUID**
   - Bootstrap Server
   - Reply with patch info

3. **Select patch for host**
   - An environment Rule is defined to map suitable environments, described by EUID values, to each multicast protocol.
   - Rule for Wide Area Overlay: {A: 2, 4}
   - Rule for Red Patch: {C: 4, 5}
   - Rule for Green Patch: {B: 1, 2, 3}

4. **Activate assigned multicast protocol, join the patch**
   - Patch Representative
     - Runs multiple multicas
t     - Bridges traffic among patches
     - Maintained by Bootstrap Server

**Results**

**Data Center Scenario:**
- Grid5000, 25 data centers, 1531 servers in total
- Quilt disseminates event messages faster than OMNI (Tree ALM) by adopting IPMC inside data centers.

**Internet Scenario:**
- Peerwise, 951 nodes in total
- Quilt disseminates streaming content faster than DONet (Mesh ALM) by limiting DONet only for nearby hosts, and using OMNI as Wide Area Overlay.