ILA container overlay with eBPF

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Motivation

• We look at container networks to support distributed scientific applications[1]
• Groups of containers need means to scale beyond the scope of a single machine, network or even data-center
• Network overlays are used to provide an abstract addressing space not bound up with the underlying infrastructure

Identifier-Locator Addressing (ILA)

ILA is an **encapsulation-free** overlay proposed by Herbert and Lapukhov[2] to satisfy two requirements:
• **Unique addressing** (each endpoint uses a separate IPv6 address it can be reached with)
• **Address mobility**

Instead of using encapsulation ILA utilizes Locator-Identifier concept:
• Left 64 bits of an IPv6 address is used as a **Locator** (identifying container host)
• Remaining 64-bit part works as an **Identifier** uniquely determining an endpoint (e.g. container)
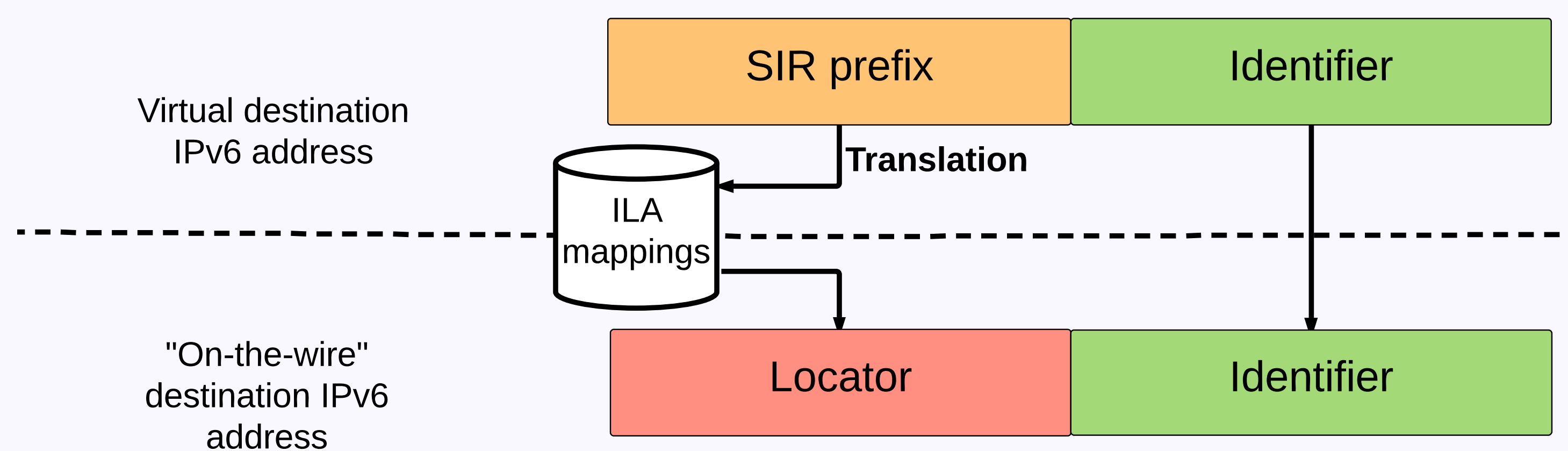
PoC ILA implementation with extended Berkley Packet Filter (eBPF)

Existing ILA software is sparsely documented and uneasy to troubleshoot. In order to better understand and evaluate ILA technology, we implement its data-plane features with eBPF programs.

In the eBPF code, IPv6 packets are processed (i.e. translated) and routed to the appropriate destination container.
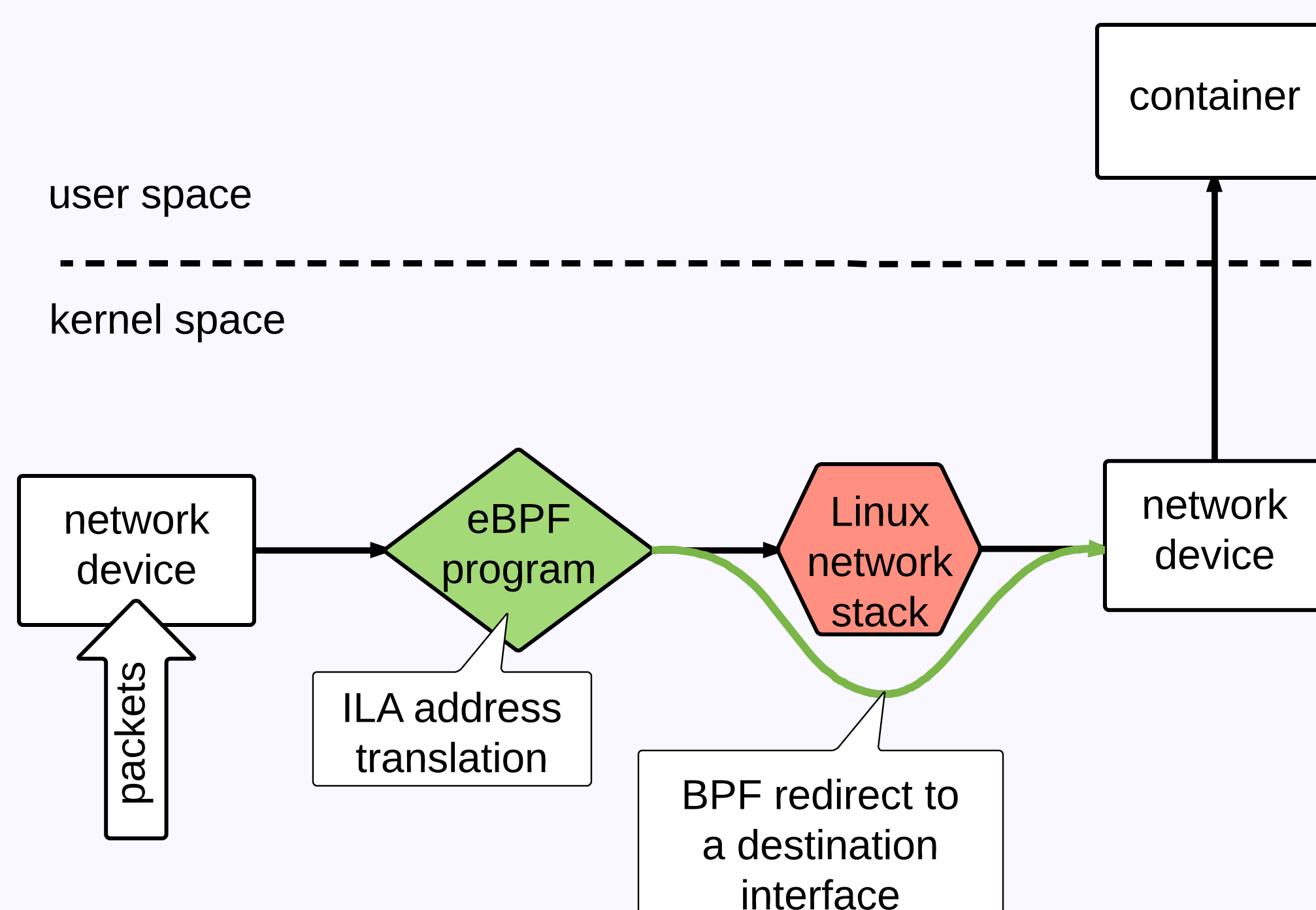
References
[1] Ł. Makowski, C. de Laat, P. Grosso, Evaluation of virtualization and traffic filtering methods for container networks, presented at INDIS 2017
[2] T. Herbert, P. Lapukhov, Identifier-locator addressing for IPv6, URL https://www.ietf.org/id/draft-herbert-intarea-ila-00.txt

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