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# User-driven networking in IaaS clouds

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IaaS clouds are becoming a commodity service that attracts an increasing number of applications. New types of applications also bring new requirements on the cloud infrastructure, including those related to networking, which may not always be possible to address using current technologies. Isolated network environments, arbitrary network topologies and ISO Layer 3 services, full user control over network flows, etc. are a few examples of services which are hard to support in current cloud infrastructures.

Our talk will present a framework to establish an overlay network for IaaS clouds. Using common network technologies the framework builds a network on the top of a cloud, which provides an ISO Layer 2 network interconnecting the cloud machines into user-driven network topologies. These isolated network environments, so-called sandboxes, provide users with full control over the networking on Layer 3. This approach allows the user to establish sandboxes with arbitrary addressing schemas of IPv4 and IPv6 or even non-IP protocols. The framework manages the pseudo-wires used as L2 links between the nodes and makes it possible to handle them separately. Individual connections therefore can be monitored or even configured to emulate various network characteristics like particular bandwidth limits, delays, packet loss, etc. In this way it is possible to simulate various kinds of connectivity models, including mobile networks, ADSLs, etc. The framework presented has been designed to be used by the end users and is mostly implemented using customized virtual machines deployed in the cloud. The setup of the framework requires only minimal support from the cloud provider.

The concept of the framework has been successfully demonstrated in the environment of the Cyber Providing Ground that is being developed to facilitate security research and training. The prototype implementation of the environment will be briefly introduced in the presentation.

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