

# Algorithm for Asymmetry AS Classification

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**Abstract**—Here we detail the algorithm for AS classification used on the paper "On the Asymmetry of Internet eXchange Points - What You See Is Not Always What You Get"

## I. AS CLASSIFICATION ALGORITHM

When we analyze IXP symmetry by the number of networks we group these networks by ASes. We want to know if that difference is restricted to isolated ASes, or is a general behavior in that IXP. To summarize the AS behavior based on each individual prefix /24 have mapped the behavior we use the algorithm we describe here.

We classify individual prefixes in Symmetric, Asymmetric Ingress, and Asymmetric Egress.

When we classify ASes, we do according to the number of networks we mapped in each AS. One AS should have 50% of samples higher than the average of the three types together to be classified as symmetric, egress, or ingress. One AS do not achieve this superiority is considered a hybrid. Hybrid ASes have an equivalent amount of symmetric and asymmetric networks. We classify each AS based on our daily sample, so it is possible same AS changes its classification every day. These are uncommon cases, normally related to small ASes with a low number of samples/IP space. We detail classification in [algorithm 1](#).

**Data:** (S)ymmetric, (I)ngress, and (E)gress networks

$M \leftarrow \text{mean}(S, I, E) \times 1,5$

**if**  $S \geq M$  **and**  $(S > I \text{ or } S > E)$  **then**

  | is-symmetric

**else if**  $I \geq M$  **and**  $(I > S \text{ or } I > E)$  **then**

  | is-only-ingress

**else if**  $E \geq M$  **and**  $(E > S \text{ or } E > I)$  **then**

  | is-only-egress

**else**

  | is-hybrid

**Algorithm 1:** AS classification based on network samples.