

Growth Models for NAPs: How to Interconnect Safely

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There is often confusion over when it works, and when it does not work, for Internet Exchange Points (NAPs) to interconnect.

The distinction is simple:

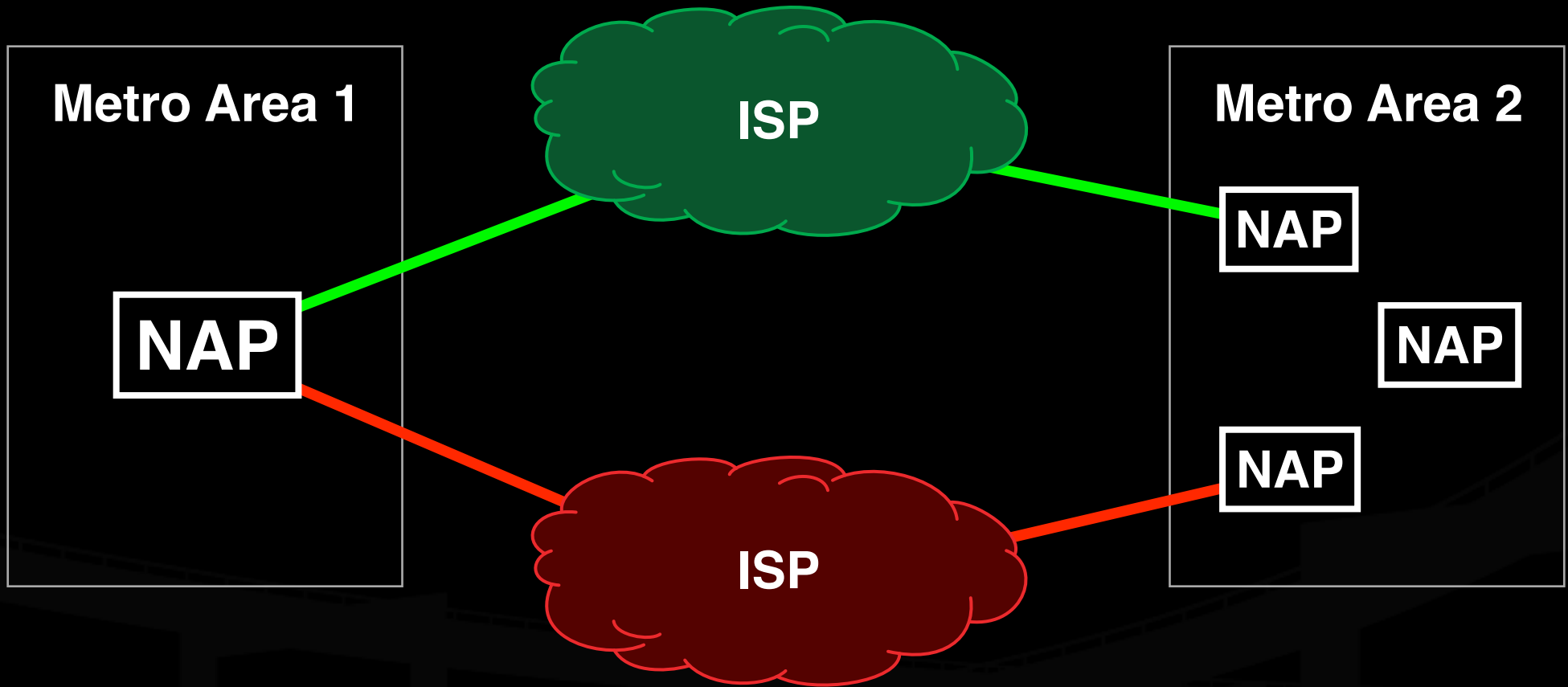
In order to avoid failure, a ratio of size must be maintained between a NAP and the ISPs which it serves.

To succeed, NAPs must be viewed as whole and individual localities by the ISPs which use them.

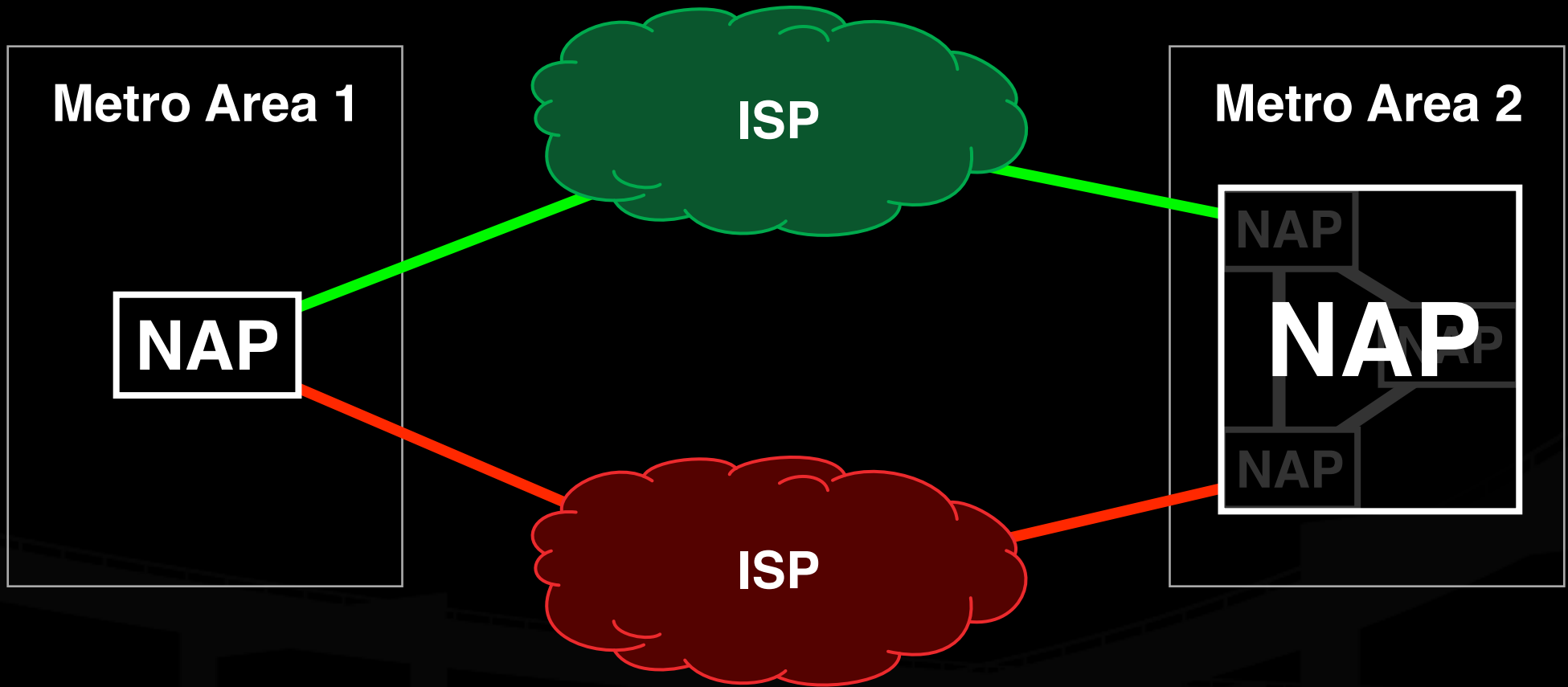
When NAPs **SHOULD** Connect:

Whenever there are multiple NAP switch-fabrics operating in the **same** metro area, an area that's **small** relative to the coverage area of the participating ISPs.

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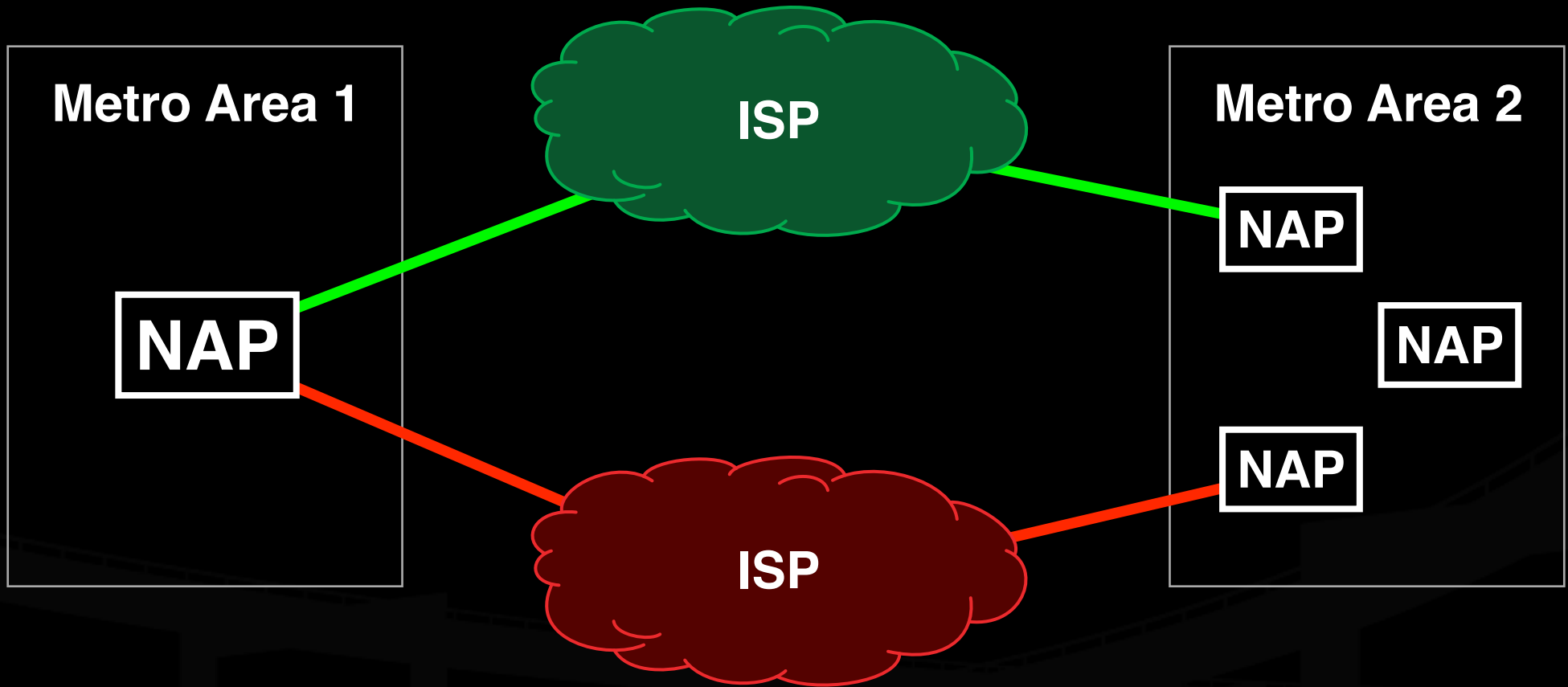
When NAPs **SHOULD** Connect:



When NAPs Should **NOT** Connect:

When there are NAPs operating in ***different*** metro areas, across an area that's ***similar*** or ***large*** relative to the coverage area of the participating ISPs.

When NAPs Should **NOT** Connect:



When NAPs Should **NOT** Connect:



Examples:

How to do it right:

Brazil's PTT Metro

Puerto Rico's NAP.PR

Seattle Internet Exchange

Hundreds more

How to do it wrong:

Examples:

How to do it right:

- Brazil's PTT Metro
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How to do it wrong:

?

Can anyone think of an example that's survived?

Interconnection within the metro area

Allow ISPs to Operate Efficiently

This is the principle purpose of NAPs.

If connecting to any NAP switch fabric in a metro area allows an ISP to peer with all of the ISPs in the metro area, the ISP does not need to waste money on multiple NAP connections in the same metro area.

Fluidity in the Market

Multiple competing NAP operators in the same metro area provide different service levels at different prices, increasing diversity and broadening the market.

As long as those NAPs are interconnected, ISPs can change between operators freely.

Interconnection outside the metro area

First, it's utterly unnecessary

Interconnecting NAPs is what ISPs do.

It's how they make money.

It's what every ISP which grows large enough does.

Without exception.

There are many more ISPs than NAPs, and in the aggregate, they know their business.

Failure Modes

The involved NAPs are dragged down by the liability of the interconnection

How is the new high cost of the WAN infrastructure covered? Who pays? For how long?

How do you avoid a tragedy of the commons?

How are the costs covered when it's not used?

Remember, the success of a NAP is easily measured as a function of the money it saves for its participants. The more money it spends, the less successful it is.

Failure Modes

More importantly, it prevents the growth of the Internet infrastructure

What business model can ISPs use to grow, if their ability to create value is removed?

If ISPs cannot grow, cannot provide a commercially-funded path forward, what remains? Dependence upon foreign aid agencies for day-to-day Internet operations?

None of these are rhetorical questions.

These failure modes have been encountered each and every time this has been tried.

They have always been fatal.

Why do people suggest this?

Typically well-intentioned people who have been involved with a single isolated NAP, and not with financial operation of an ISP.

The fundamental mistake is to assume that the NAP itself is a goal, rather than a mechanism to serve the growth and economic health of the Internet.

This is not an uncommon problem. Philip Smith and I and others who work on NAPs have heard it, several times a year, for the last fifteen years.

Will it ever work?

No. This is a fundamental matter of economics. It has failed *each and every time* it's been tried. Each of the four hundred and fifty NAPs in the world today are there because they have *not* tried to do this. There is no magic which will make a future attempt less catastrophic.

What benefit could accrue?

Could a central monopoly provide lower prices than a multitude of competitors?

Could a central monopoly provide more technical innovation?

Could a central monopoly provide faster growth?

Interconnection within the metro area is necessary and promotes growth and prosperity.

Interconnection outside the metro area causes the economic failure of NAPs, ISPs, and the Internet economy of the region.

Remember, this is good news.

More benefit for less work.