

India's RPKI journey

From ROA coverage to ASPA leadership



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NIXI / IRINN — India's National Internet Registry



Routing Security SIG · APNIC 62, Mumbai · 9 September 2026

What NIXI actually runs



Three pieces of national Internet infrastructure

IX

India's Internet exchange.
Route servers run BIRD.

.IN ccTLD

India's country-code top-level
domain.

IRINN

The National Internet Registry,
under APNIC. Allocates v4, v6
and ASNs, and runs the RPKI
facility members sign with.

ROV and ASPA validation at the IX is on the roadmap, expected by end of Q1 2027.

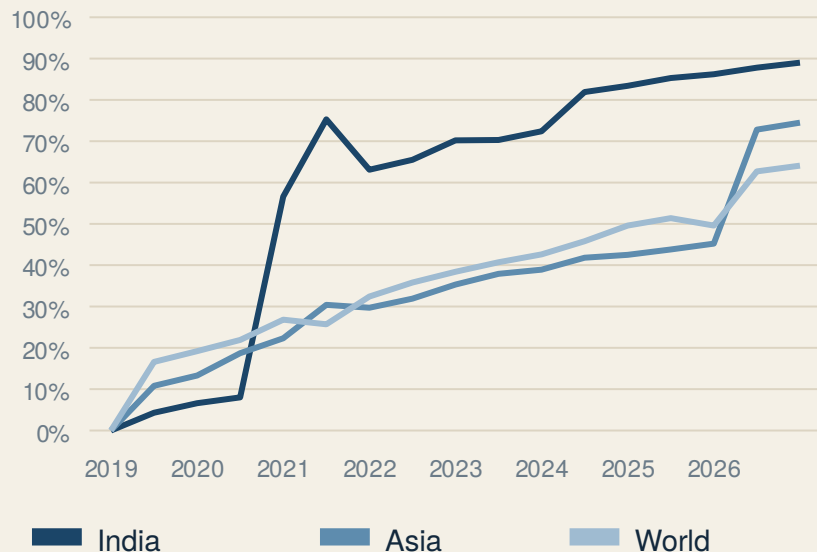
Every number that follows comes from public data — APNIC Labs, the RPKI repositories, APNIC whois.

India: 8% to 89% in six years

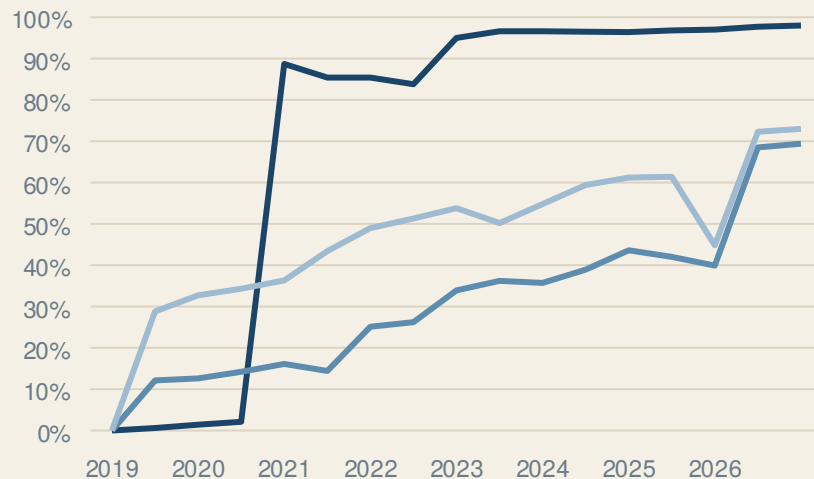


Address span covered by a valid ROA, 2019–2026

IPv4



IPv6



India signed IPv6 first — 89% by January 2021, when IPv4 was still 57%.

APNIC Labs ROA use measurement, 9 January 2019 – 5 September 2026. “Asia” is the UN sub-region (XD), not APNIC's service region.

Two questions, two answers



India, 5 September 2026

How much of India's IP space is covered?

89.0%

IPv4

98.0%

IPv6

How many of India's IP announcements are covered?

85.7% IPv4

85.2% IPv6

The signed IPv6 blocks are the big ones. Weighted by space it looks like 98%; counted by announcement it is 85%.

APNIC Labs. Measured against announced address space, not delegated resources — counting delegated ASNs puts India at 48%, but thousands have never announced a route.

Only ~1% of routes are validated



Share of routes behind networks that enforce ROV

India

~1.2%

World

~27.3%

Five operators

Jio, Airtel, BSNL and Vi carry most of India's users. Tata sits upstream of many smaller ISPs — its adoption alone would cascade.

Origin validation is only half of it

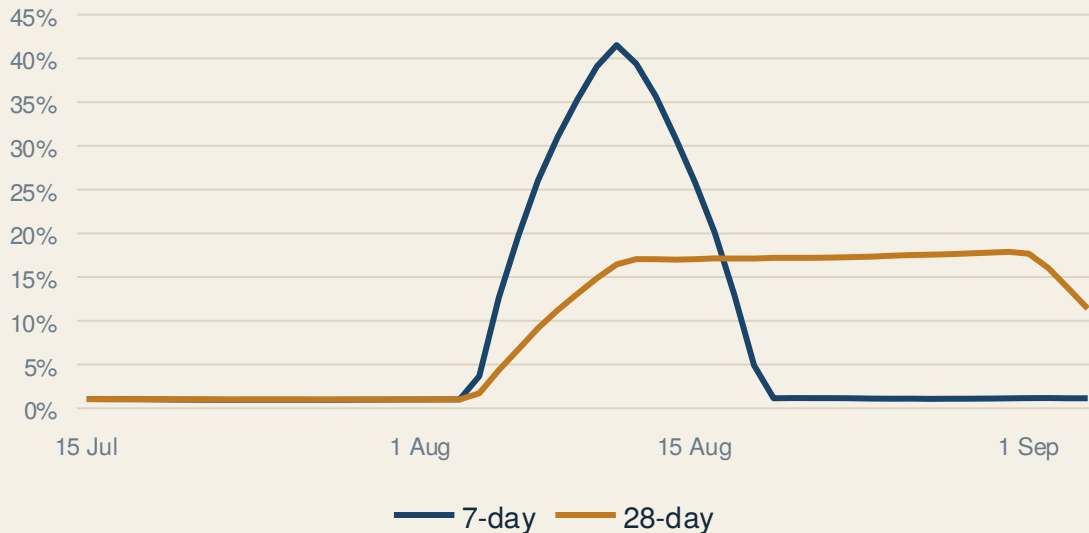
ROV checks who originated a route, not the path it travelled. APNIC enabled ASPA publication in MyAPNIC from July 2026, and NIXI intends to drive both together. The next slide but one shows why that matters.

APNIC Labs I-ROV measurement, 7-day window, 4 September 2026. A synchronized 4–18 August anomaly moved the India and world series together and is still clearing from the 28-day figures — even APNIC's own measurement had a two-week glitch.

A measurement anomaly worth flagging



India I-ROV filter rate, 7-day and 28-day windows



What we see

Flat near 1% until 3 August. The 7-day series rises to 41.5% on 11 August, then returns to ~1.15% and stays there.

The world did the same

Identical dates, peaking 56.6% on 11 August. Two independent series moving together.

A question for APNIC: does this look like a collection artifact?

Why the gap exists



What members tell us when we ask

Signing is a form. Validating is a change request.

A ROA or an ASPA is a login to MyAPNIC or myIRINN. ROV means standing up a validator and putting a new dependency in the production forwarding path — on kit that may not speak RTR yet.

Everyone would rather go second.

If your upstream filters, you inherit most of the protection for free. Waiting is rational for an edge network — even though enabling it protects your own customers whatever anyone else does.

The fear is larger than the risk

Enforcing in India today would reject 0.32% of announced address space — below the world average of 0.42%.

0.32%

India

0.42%

World

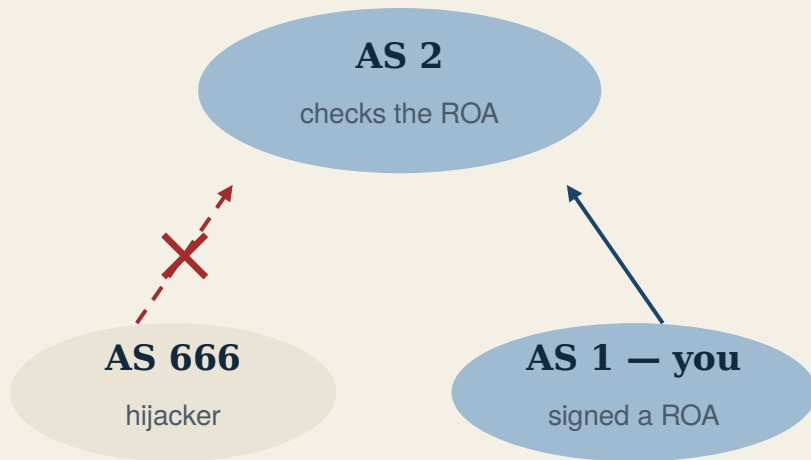
Invalid share of announced IPv4 address span, APNIC Labs, 5 September 2026. India 303 invalid route objects of 54,492.

Same hijack, two networks



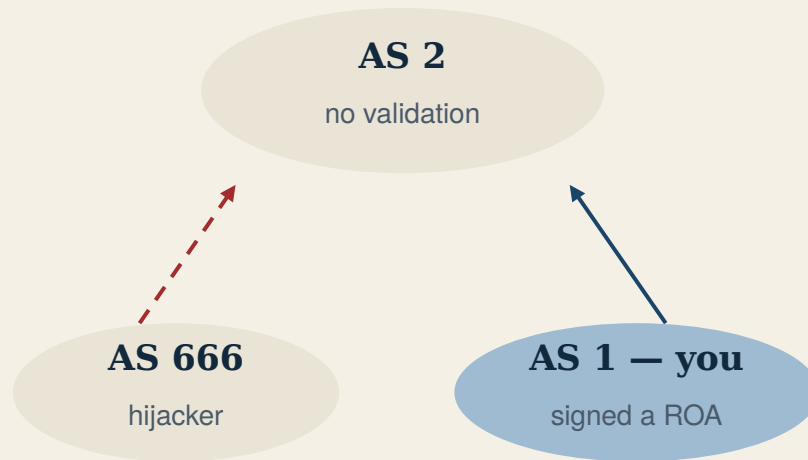
The simple case: the only difference is whether AS 2 validates

AS 2 runs ROV



Traffic reaches the real AS 1

AS 2 does not



Traffic goes to AS 666

A hijack that was RPKI-valid



Softaculous / Virtualizor, 28 August 2026



A more-specific /24 of Hetzner's 162.55.0.0/16 appeared with AS24940 appended as the origin. It carried Softaculous's software update endpoint.

ROA

Published

The maxLength allowed /16 to /24, so the hijacked /24 was inside the authorisation.

ROV

Enforced

The route was RPKI-valid.
Networks dropping invalids had nothing to drop.

ASPA

Absent

The path claims Hetzner announced to a small hosting provider.

Coverage is not protection. A loose ROA authorised the hijack.

Kentik, Doug Madory, 2 September 2026. Kentik's recommendation is strict ROAs per RFC 9319; the ASPA reading is ours.

ROV does not drop unsigned routes



Three states, not two

Valid

Accept

Unknown

Accept

Invalid

Drop

Only a route that contradicts a published ROA is rejected. The large share of the table that has no ROA is Unknown, and Unknown is accepted — so filtering does not break it.

Most of the hesitation we hear comes from assuming “drop invalid” means “drop unsigned”. It does not.

If India were cut off, RPKI holds



What happens when the repositories are unreachable

RPKI

Validators cannot refresh. Objects age out, and those routes become Unknown — absence of data, not contradicting data.

Unknown is accepted. Routing keeps working.

DNSSEC

A validating resolver that cannot verify a signature returns SERVFAIL.

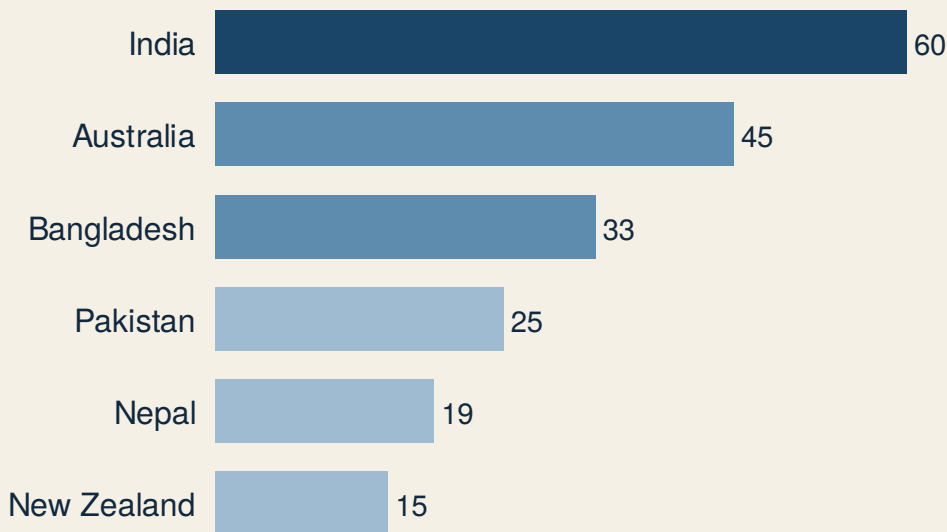
Names stop resolving. The same cryptographic idea, the opposite failure posture.

An isolated India loses the extra protection. It does not lose reachability.

India leads the region on ASPA



ASNs publishing at least one ASPA object



49 of 60

are IRINN registrations. The other 11 are direct APNIC delegations.

And being caught

In the last week Australia added 8 and Bangladesh 16. India added 3. We lead today.

Who is actually publishing



The 60, by the kind of organisation they are

Education

National Knowledge Network x6
IIT Bombay · BITS Pilani
NIT Karnataka · NIT Trichy

Government

National Informatics Centre
ISRO Space Applications Centre
Physical Research Laboratory

State utilities

Telangana Fiber Grid
Gujarat Urja Vikas Nigam
Tamil Nadu Transmission

Enterprise

IndianOil Corporation
Glencore

Service providers

ZeaCloud · Spiretel · Indigo
Mahavision · Nuozen · Precisecloud

NIXI's own

Bharat Public DNS
Delegated RPKI test bed

Not on this list: Jio, Airtel, BSNL, Vi, Tata Communications.

Our own CA under APNIC delegation



Delegated RPKI: where the test bed actually is

Where we are

A Krill instance under APNIC delegation, with sub-delegation to member ASNs exercised end to end.

What it is not

Not production. “Tested and maturing” is accurate; “production-ready” is not.

What comes next

Integration into the myIRINN portal, gated on validation rather than on a date.

The value of a test bed is not only how it worked. It is that we found out how it fails before members depended on it.

Reachability is a ROV dependency



Three of five RIRs put their RPKI data behind a CDN. Two do not.

APNIC

Cloudflare

RIPE NCC

Akamai

AFRINIC

Cloudflare

ARIN

self-hosted

LACNIC

self-hosted

Independently measured, not just our view: RIPE's CDN endpoint answers in under 10 ms from every continent, while ARIN's runs 100–300 ms or worse outside North America.

What we saw from India

Daily deltas fetch fine. A full snapshot after a multi-day gap fails mid-transfer, and there is no resumable fetch. The validator that most needs to resync is the one that cannot.

Nothing alarms

Most relying-party software will not fall back to rsync once it has settled on RRDP. Objects age out, that RIR's space becomes Unknown — and Unknown is accepted.

Our ask: RIRs should consider CDN-fronting RPKI data.

CDN survey by DNS resolution, 4 September 2026. Latency comparison: MANRS, June 2025. Fallback behaviour: APNIC Blog, March 2021.

Adoption is not a one-way ratchet



Two things the headline counts hide

Some ASNs withdraw

A number of ASNs have published an ASPA and later removed it. Track net counts only and you will never see that churn.

Two ASNs declare AS 0

AS55518 is Singapore Internet Exchange's route server, which originates nothing — a textbook case.

AS131211 is registered to APNIC itself and looks like a MyAPNIC test object: no peers, no upstreams, no downstreams.

A question for APNIC: deliberate test object, or something to keep out of the production repository?

What we commit to next



Four items, one of them a correction

- **ROV and ASPA validation at the IX**

On NIXI's BIRD route servers, by end of Q1 2027.

- **ROV outreach to the large operators**

The five networks that actually move the national number.

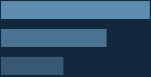
- **ROA quality, not just coverage**

Guidance to members: leave maxLength unset, and sign every prefix you announce — not one of them.

- **500 ASPAs by APNIC 63**

We aimed for 200 before this meeting. We are at 60.

Publishing is the easy half, and India has done it. The validating half is still ahead of us.



Thank you — questions?

Live figures, refreshed daily:

rpki.gauravkansal.in

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