OpenID Federation 1.0 and EUDIW TL / X.509 PKI in IT-Wallet

A **state of play** on **trust management** in the **Italian IT-Wallet** and how it reads **next to EUDIW**.

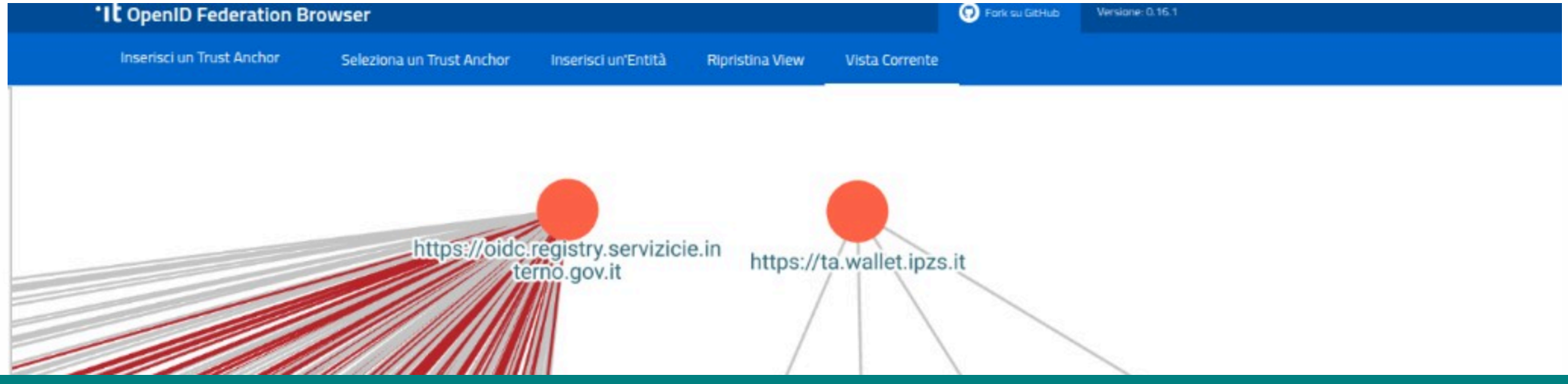
with Giuseppe De Marco, *Technical Project Manager — Dipartimento per la trasformazione digitale, Presidency of the Council of Ministers of Italy*

Today in 4 parts

0. **OpenID Federation in Italy** — SPID/CIE OIDC vs. IT-Wallet.
1. **OpenID Federation in IT-Wallet** — final alignment with **Federation 1.0**, federation **endpoints**, progresses with **Federation Wallet Architectures**.
2. **EUDIW trust management** — overview, responsibility matrix, design concerns, domestic gaps.
3. **Costs** — many sources, huge trust surface; dual evaluation paths; participant obligations.
4. **Evolution** — onboarding APIs, ACME + Federation, OpenID Federation Wallet Architecture draft maturity.

Two trust-evaluation approaches, one ecosystem

- **History:** at IT-Wallet kick-off (PoC in October 2023, pre-release in October 2024), **OpenID Federation** was the more **mature, implementable** horizontal trust layer for a **national** federation.
- **Today:** Federation **1.0** track is definitively **stable**; ARF / TS / LoTE still **move quickly** with evident complexity and overlapping mechanisms — reasonable to **integrate European profile pieces where legally required, without collapsing national federation design**.
- **Strategy: incremental convergence** on outputs (what verifiers can prove) rather than forcing one protocol stack everywhere.



Part 0 — Legacy SPID/CIE vs IT-Wallet based **Federation 1.0** (short intro)

The **national IT-Wallet rules** align with **OpenID Federation 1.0** and the **OpenID Federation Wallet Architecture** draft. While pre-1.0 OpenID Federation drafts are used in the the legacy OIDC SPID/CIE profile (January 2023).

Two different Federations, using two different Trust Anchors.

OIDC CIE/SPID should be updated with Federation 1.0 (and OIDC iGov too) assuring retrocompatibility to previous implementations.

spid-cie-oidc-django exemplifies how **retrocompatibility is achievable**.

Part 1 — Federation API surface (Trust Anchor / Intermediate)

API	HTTP	Roles	Norm	Body
Entity config	`GET /.well-known/openid-federation`	TA,Int,WP,RP,CI	MUST	`entity-statement+jwt`
List	`GET …/list`	TA,Int	MUST	JSON
Fetch	`GET …/fetch?sub=`	TA,Int	MUST	JWT
TM status	`POST …/trust_mark_status`	TA,Int	**OIDF** SHOULD → **IT-W** MUST	JSON
TM list	`GET …/trust_marked_list`	TA,Int	**OIDF** MAY → **IT-W** SHOULD	JWT
Hist keys	`GET …/historical_keys`	TA,Int	**OIDF** MAY → **IT-W** MUST	JWT
Sub events	`GET …/subordinate_events?sub=`	TA,Int	**OIDF** MAY (ext.) → **IT-W** MUST	`entity-events+jwt`
Resolve	`federation_resolve_endpoint`	any	**OIDF** MAY (§8.3) → **IT-W** OPTIONAL	—

- IT-Wallet uses the **Federation Subordinate Events Endpoint** as defined in **`OID-FED-SUBORDINATE-EVENTS`**: openid-federation-subordinate-events-1_0. Purpose: historical **registration / revocation / JWKS update** events for immediate subordinates — transparency for lifecycle and audits (**Federation Subordinate Events** in the **IT-Wallet** trust model).

Part 1 — The remark about Wallet Instances using OpenID Federation

⚠️ **Reminder — Wallet + federation:**

Wallet Instance **must not** publish discoverable online metadata; federation endpoints are all **public without client credentials** that identify callers.

Part 1 — Protocol-specific metadata: IT-Wallet vs Federation 1.0

Role	Metadata (beyond base `OID-FED`)	IT-Wallet / draft note	`OID-FED-WALLET` (draft)
Any federation leaf	`federation_entity`	**Required**; `logo_uri` = **SVG**; `contacts` (e.g. **PEC**) where the profile tightens presentation. Federation base.	—
Relying Party	`openid_credential_verifier`	Verifier metadata for **OpenID4VP** / presentation (e.g. attested URIs when `client_id` = `openid_federation`)	**Covered**
PID / (Q)EAA provider	`openid_credential_issuer` · `oauth_authorization_server`	**Combined** in one **EC or split**; if split, CI carries `authorization_servers` → AS	**Covered**
Wallet Provider	`wallet_solution` + `federation_entity`	WP's **single** Wallet Solution	**Not covered**

Part 1 — Federation Profile delta in OpenID4VCI Metadata

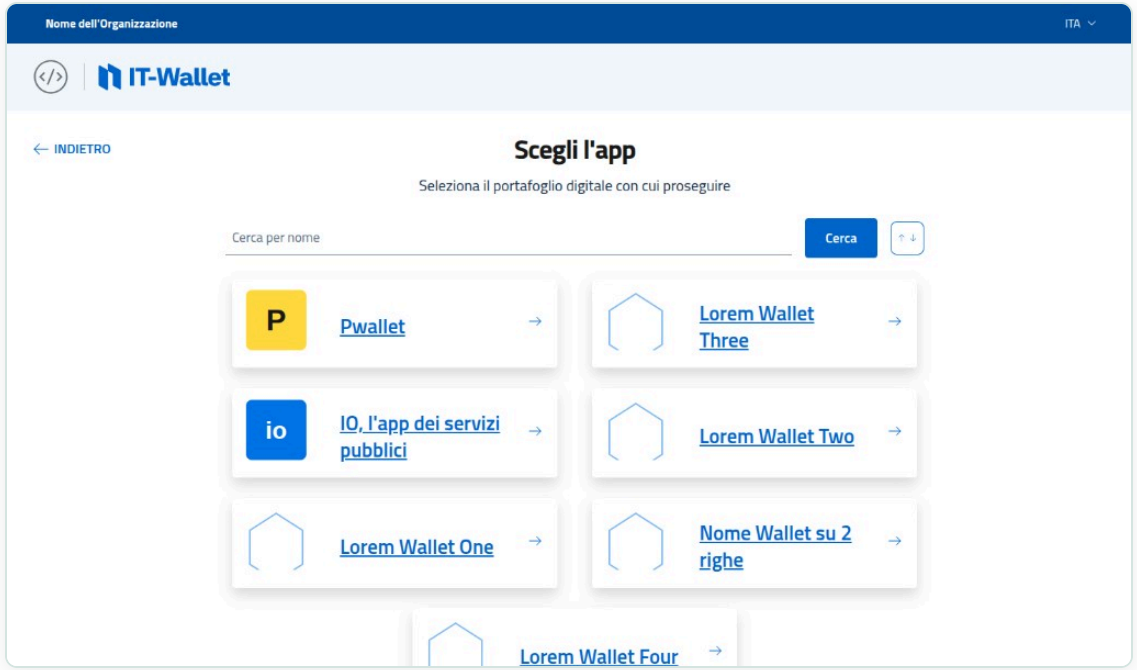
Focus	IT-Wallet / OpenID4VCI rule	Highlights	OpenID alignment
`jwks` by value	`openid_credential_issuer` and `oauth_authorization_server` MUST publish `jwks` **by value** (not reference-only)	National **credential issuer metadata** profile; `OID-FED` §5.2.1 / `JWK`	**Covered by** `OID-FED-WALLET`
`trust_frameworks_supported`	**REQUIRED** (national issuer profile)	Declares frameworks used in the **authorization** flow (e.g. CIE, eIDAS, L2+)	**Covered by** `OID-FED-WALLET`
`schema_id` / `authentic_sources`	**REQUIRED** per–credential configuration	National **schema** + **authentic-source** registries	**Covered by** `OID-FED-WALLET`
`status_list_aggregation_endpoint`	**REQUIRED** where the profile mandates	**Token Status List** aggregation for credential / token status	**Covered by OpenID4VCI**
SVG-first issuer / credential display	**REQUIRED** where the profile mandates	**Display** / artwork rules for issuer and credentials	**Covered by OpenID4VCI**
`batch_credential_issuance` (+ `batch_size`)	**OPTIONAL**	Advertise **batch** issuance when supported	**Covered by OpenID4VCI**

Part 1 — Federation Profile delta in OpenID4VP Metadata

Topic	Metadata / behaviour	IT-Wallet & alignment	OpenID specs coverage
Attested URIs (`client_id` = `openid_federation:`)	`openid_credential_verifier` lists `request_uris`, `response_uris`, `redirect_uris` (pre-registered) → wallet rejects **endpoint mix-up**	Satisfied. `WP_081`, `WP_091a`, `WP_094a`; remote-presentation test matrix	**OpenID4VP** verifier metadata; `OID-FED-WALLET` (draft) attested URI model (aligned checks)
`x509_hash:` **path**	Same semantics via `client_metadata` carried **in the request** (not federation verifier URI lists)	Satisfied	**OpenID4VP** `client_id` prefix `x509_hash:` + in-band `client_metadata`; national `remote-flow` narrows behaviour
Encrypted VP response	`encrypted_response_enc_values_supported` for `direct_post.jwt`	Satisfied	**OpenID4VP/HAIP** (encrypted authorization response path)
Verifier `logo_uri`	`logo_uri` as **SVG**	National `openid_credential_verifier` presentation rules	**OpenID4VP** verifier **display** metadata
`erasure_endpoint`	**Conditional** verifier metadata when the RP requests **strongly identifying** claims	**IT-Wallet–specific** RP / credential-verifier extension	**Outside OpenID4VP core** as a **universal** field — **national** profile add-on

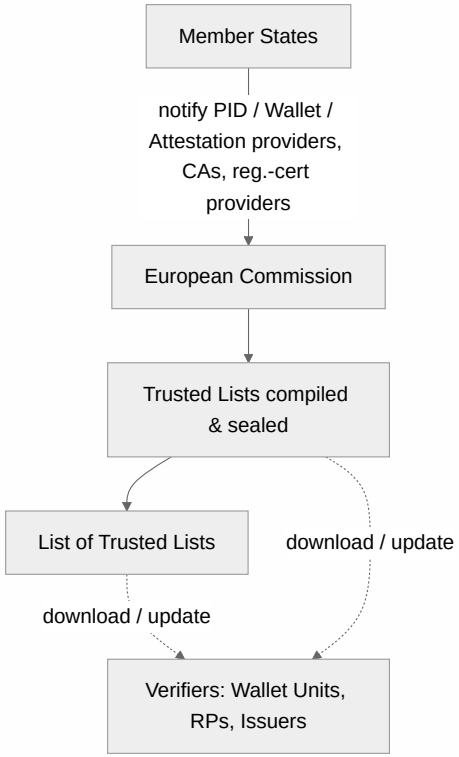
Part 1 — Wallet solution selection & custom URI mitigation

- **UX:** national proxy **wallet selection** preview — iam-proxy-italia IT-Wallet.
- **Security:** custom `scheme://` invocation risks **phishing** / **handler clash**; prefer **HTTPS picker** on a **known origin** + **app/universal links** where possible — **custom-URI fallbacks** remain **typosquatting**-sensitive.
- **Scale-out:** many subordinates may need **bulk / paged listing** beyond `federation_list_endpoint` — draft Extended Subordinate Listing 1.0.



Part 2 — Responsibility matrix (recap)

Role	Registration	TL / LoTE publication	Notes
PID Provider	MS registrar	**EC** PID Provider TL / LoTE	MS approves/registers; EC publishes notified trust anchors
Pub-EAA Provider	MS registrar + MS notification to EC	**EC** PuB-EAA TL / LoTE	Public-sector attestation path; EC publication
EAA Provider	MS registrar	MS registry / national trust sources	Non-qualified path; rulebook-driven trust model
QEAA Provider	MS registrar (QTSP domain)	MS QTSP TSL (discoverable via EU LoTL)	Qualified-signature validation on QTSP trust services
Wallet Provider	notification MS → EC (no registrar onboarding)	**EC** Wallet Provider TL / LoTE	Wallet-unit attestation trust anchors distributed by EC
WRP	MS registrar	MS RP registry API / signed registry output	Intended-use and attribute scope from registrar data
WRPAC	MS-notified Access CA (to EC)	**EC** Access-CA TL / LoTE	Issues RP access certificates used in presentation auth
WRPRC	MS-associated provider + MS notification to EC	**EC** Registration-Certificate-Provider TL / LoTE	Issues RP registration certificates (per intended use)



Part 2 — EUDIW uses an Hierarchical authoritative listing model

Participants register nationally; **CIRs/IETF/ARF** describe who publishes what (PID TL at EC, many wallet-provider / WRPAC lists, sector-specific registration artifacts, …). **List of Trusted Lists/trusted lists/LoTE** represent this articulated division of roles and subjects.

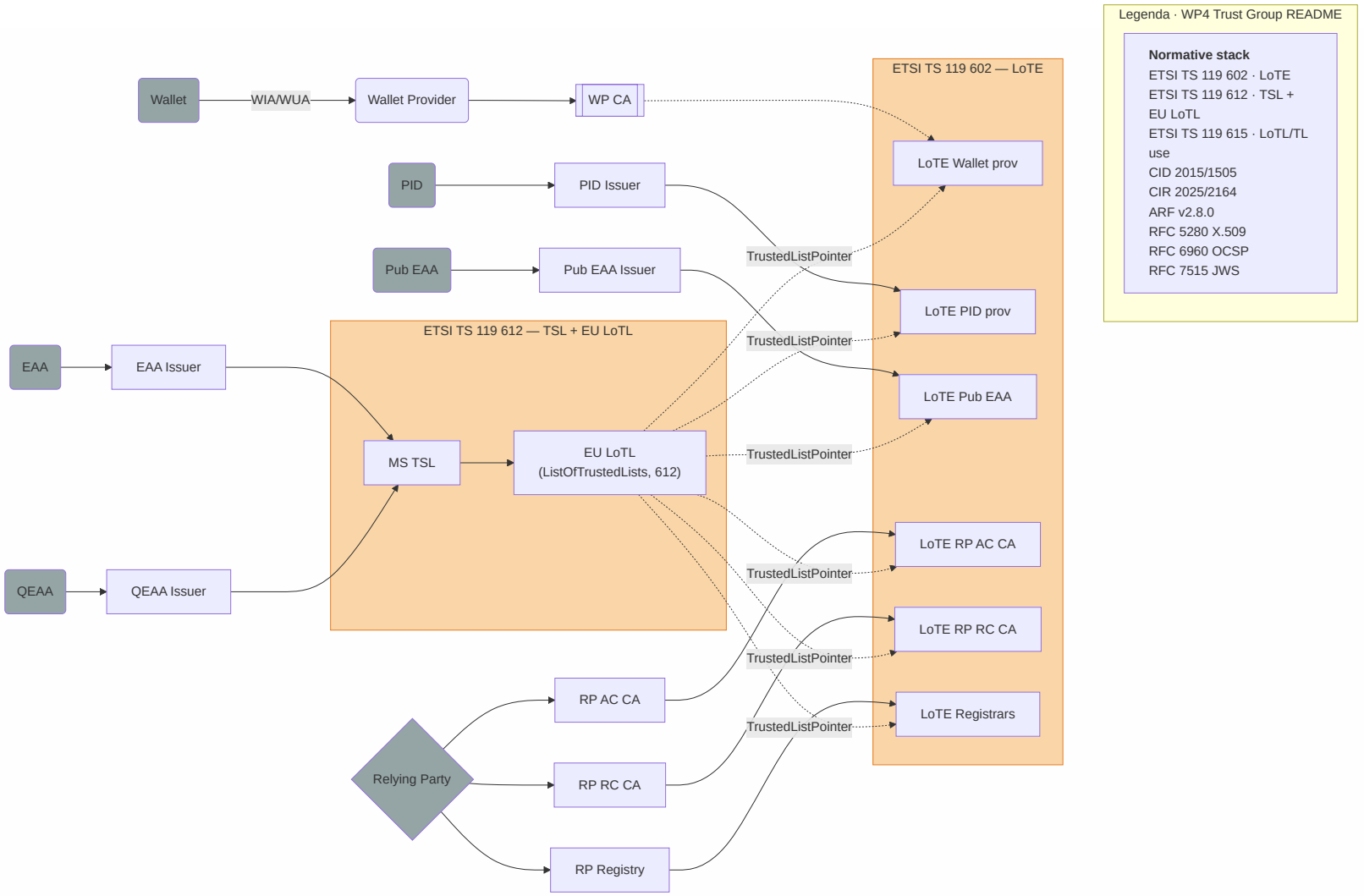


*Diagram: **dotted** arcs — LoTL **indexes** LoTE-family lists; **solid** path — MS **TSL** feeds LoTL. **Normative refs** (versions, CIR, ARF) are in the **figure legend** (Mermaid).*

Part 2 — Design pressure & trusted-list singularities (matrix)

Area	Mechanism	Impact
Multi-role duplication	One entity, **several operational roles ⇒ separate TL/LoTE appearances**; artefacts in **JSON and XML** (**602 / 612**)	**Duplicate checks**; **no safe dedupe** by corporate identity; **dual parser / policy** paths
Verifier load	Trust evidence **across TL/LoTE**, **status** APIs, **registration**, **federation** metadata	**Wallets & RPs** must **resolve and correlate** many sources at issuance **and** presentation
Trust drift	**Independent** publish / revoke cadences, caches, CDNs	Same subject can appear **trusted in one list view, stale or revoked in another**
WSCD	Assurance stops at the **device / hardware** boundary	**Non-repudiation** claims are **bounded**
Registration graph	**MS vs EC** roles; notification vs full registration	Not a **single TL hop**—orchestration is a **graph** of steps
Domestic vs EC lists	**PID / PuB-EAA / Wallet** provider TLs **hosted at EC**; MS may still add **parallel national** lists or flows	Verifiers **branch** on **domestic** vs **cross-border** list sets; **no single uniform TL cloud**

Part 2 — Domestic gap & Italian choice

Topic	Position
EC-hosted lists	**EC-hosted lists** (PID, Pub-EAA, Wallet Provider, WRPAC, …) **do not** map 1:1 onto **national-only** trust needs; Member States remain free to operate **additional** national infrastructures.
Italian approach	Keep **OpenID Federation** as the **national, JWT-first trust plane** for wallet ecosystem participants, while **EUDIW ARF / TL obligations** are met where mandated (X.509 access certs, EC lists, registrar APIs) — **avoid forcing one technology to emulate the other**.
Implication	Full "harmonisation" into a single mechanism is **not** pursued; **interworking** and **clear client signalling** matter more.
`client_id_prefixes_supported`	`openid_federation` vs `x509_hash` — two ways the verifier knows which trust machinery applies.
`openid_federation:`	The **federation trust chain** and entity configuration `sub` must match the presented identifier.
`x509_hash:`	The hash of the **RP access certificate** `x5c` (per national **access** rules and **LoTE of Access**) must match the embedded hash (**bound by reference**).

Part 3 — Cost lens: multiplicity vs federation chain

Lens	Position
EUDIW path	Presentation may touch **TLS / access cert**, **OCSP/CRL**, **one or more registration certificates**, **several status lists / registry APIs**, **discovery** — **five-ish trust surfaces** before app logic.
OpenID Federation path	One **trust chain** of signed statements + optional trust marks + historical JWKS + policieis + **subordinate events**.
Critique	Duplicated **revocation / freshness** semantics across X.509 and JWT worlds if both are always evaluated -> **rule:** once an X.509 is issued its lyfecyle is handled using PKIX tools and not openid federation API.
Mitigation for RPs	Choose `x509_hash` presentation where acceptable to **reuse X.509-heavy verifier patterns** from EUDIW discussions and **trim live federation fetches** on the hot path (still subject to national profile rules).

Part 4 — X.509 Issuance

- **Today:** parts of onboarding lean on **custom / national APIs** and registries (not a single OIDF profile) for automated X.509 issuance.
- **Current state:** national **access / federation entity X.509** processes are not standardized yet, compared with commodity ACME automation.
- **IETF direction:** draft-ietf-acme-openid-federation — bind ACME issuance to federation entity identifiers to **reuse ACME clients** instead of one-off custom enrollment APIs (cost reduction for participants, relying on already available ACME client implementation).

Part 4 — Onboarding API still not proposed for standardization

- **Possible direction (idea):** analogous to **OIDC Dynamic Client Registration**, a **federation-scoped registration draft** could register an entity **with the federation authority**, not with a single OP — *discussion for standards*, not a commitment.

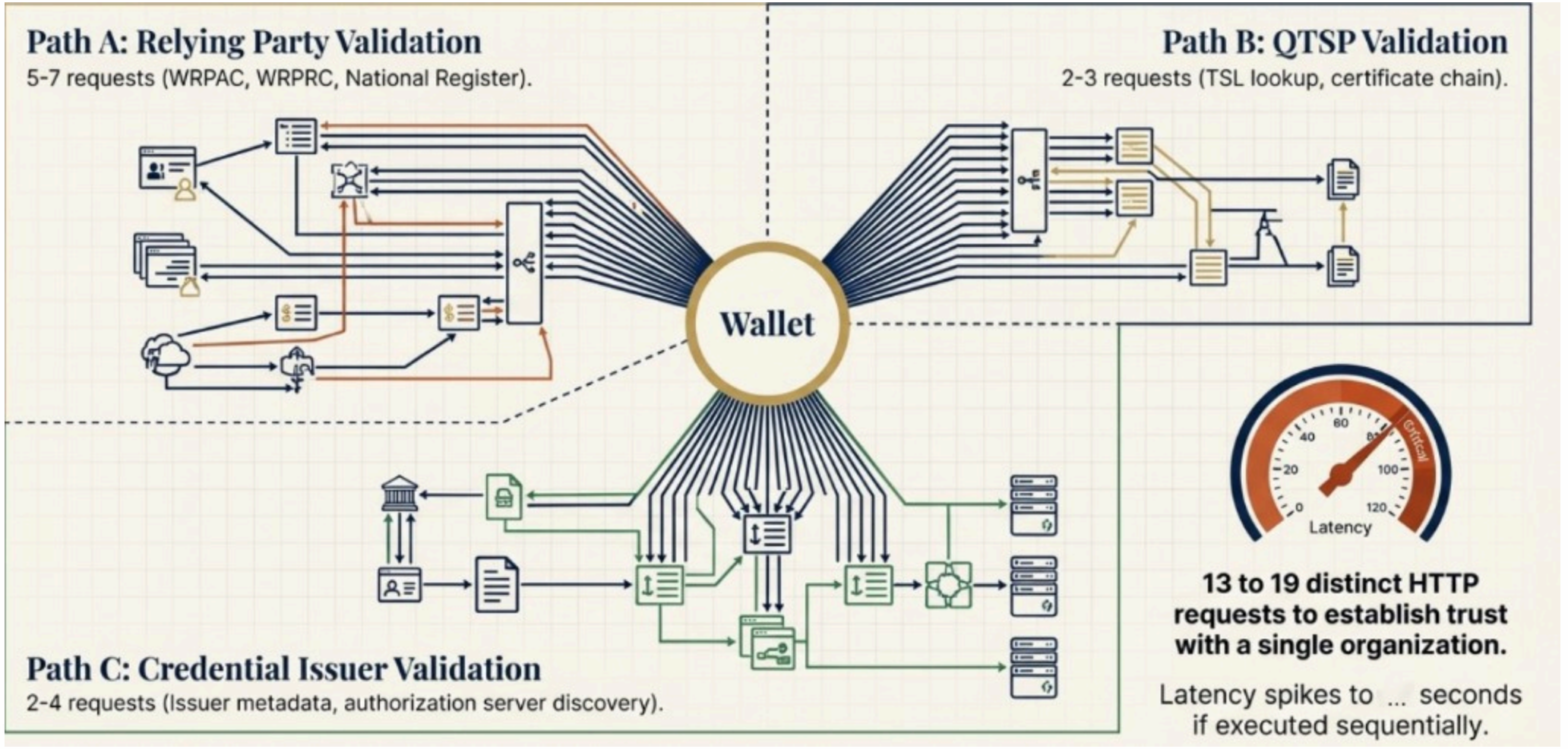
FBK, IPZS, Mike ... is there space for that?

Part 4 — OpenID Federation *Wallet Architectures* (draft)

- `OID-FED-WALLET` **remains a draft** — Italy intends to **harden practice first** and **feed evidence into standardisation**, rather than rushing **optional or underspecified** features before they are **operationally validated**.

Part 4 — Trust proxies

- **No appetite (today) for "trust proxies"** that would call Federation APIs to **re-evaluate foreign TLs / revocations** on behalf of wallets: risks include **privacy** (who is probed), **SPoF**, and **trust drift** when proxy caches diverge from wallet-local policy / TTLs.



Thank you

Questions?

peppelinux.github.io/Wallet-Presentations/