

DPI 2.0: The Subsidiarity Layer

A Governance Routing Protocol for India Stack

Version: 0.3 (India Adaptation – Deployment-Ready Specification) **Target:** EkStep Foundation, NITI Aayog (technical working group), NDMA **Architectural Status:** Open Standard – DPI-Compatible

Executive Summary

India has built the most successful Digital Public Infrastructure (DPI) in the world:

- **Aadhaar:** Identity for 1.4 billion people
- **UPI:** Real-time payments at planetary scale (over 10 billion monthly transactions)
- **DEPA:** User-owned data empowerment
- **ONDC:** Open network for digital commerce

This is the digital plumbing.

What India lacks is the **governance routing layer**—the protocol that determines *where* decisions should be made, *how* resources should flow, and *which* scale (local, state, or national) is optimal for any given problem.

The result: a hyper-efficient digital infrastructure serving a **centralized governance architecture** that cannot match the variety of 1.4 billion people across 28 states.

DPI 2.0 adds the missing layer. It is not a political argument for decentralization. It is a **technical solution to measurable governance problems:**

- **Disaster response:** Reducing latency from days to hours
- **Welfare delivery:** Improving targeting precision
- **Informal sector visibility:** Measuring economic activity that GDP misses

What the center gains: Faster, more visible outcomes. Better metrics. Strategic visibility into the informal economy. Electoral accountability for results, not process.

This is a protocol **designed for** Indian infrastructure and constitutional principles—built on India Stack, anchored in Indian data sources, and aligned with Indian governance realities.

1. The Structural Problem: Latency at Scale

India possesses extraordinary digital infrastructure but faces a governance architecture that cannot fully utilize it. The problem is not digital. The problem is **governance latency**—the time between problem emergence and resource arrival.

1.1 The Disaster Response Problem (Phase 1 Domain)

The problem is measurable:

Event	Outcome	Latency
2018 Kerala floods	483 deaths, ₹31,000 crore in damages	Central relief reached many districts after 72+ hours (Source: CAG Audit Report No. 15 of 2021, <i>Performance Audit of Disaster Management in Kerala</i>)
2023 Himachal Pradesh floods	500+ deaths	State-level resources overwhelmed; central coordination delayed by bureaucratic routing (Source: Himachal Pradesh State Disaster Management Authority, <i>Post-Disaster Needs Assessment</i> , 2023)
2024 Wayanad landslides	400+ deaths	NDRF deployment required central authorization; local knowledge inaccessible to formal systems (Source: NDMA internal review, cited in <i>The Hindu</i> , August 2024)

Why this happens: Disaster response requires three layers of coordination:

- **National:** Budget allocation, military deployment, satellite imagery
- **State:** Infrastructure coordination, public health response
- **District/Block:** Local knowledge of vulnerable populations, informal networks, community capacity

The current system routes everything through the center first. The National Disaster Response Force (NDRF) is world-class—but it cannot be everywhere simultaneously. Local knowledge of vulnerable populations (the elderly, the disabled, informal workers) exists at the district level but is inaccessible to formal systems.

DPI 2.0 solves this: The Global Subsidiarity Index (GSI) identifies optimal routing for disaster response—some resources nationally coordinated, some state-managed, some locally directed. The result is not decentralization. It is **faster, more precise allocation**.

What the center gains: Measurable reduction in disaster mortality. Visible outcomes. Electoral credit for lives saved.

2. India Stack: The Foundation

DPI 2.0 is built *on top of* India Stack, not parallel to it.

India Stack Layer	DPI 2.0 Integration
Aadhaar (Identity)	Optional authentication path; not required for core functionality
UPI (Payments)	Value transfer remains in UPI; DPI 2.0 adds reputational layer without processing transactions
DEPA (Data)	User-owned data principles extended to reputation; users control disclosure of trust proofs
ONDC (Commerce)	Reputation portability across open network; trust builds across platforms
DigiLocker	Storage for zero-knowledge reputation proofs; user-controlled access
Diksha (Education)	Potential integration for skills verification in informal sector

Explicit boundary: DPI 2.0 is a **Layer 2 Reputation Oracle**. It does not:

- Process financial transactions (remains in UPI)
- Store personal data centrally (remains user-owned via DEPA)

- Create new currency (strictly reputational)

3. Protocol Architecture: The Subsidiarity Layer

DPI 2.0 adds three capabilities to India Stack:

3.1. The Global Subsidiarity Index (GSI) – Disaster Domain

The GSI is a diagnostic algorithm that identifies the optimal governance scale for disaster response. For Phase 1, the GSI is scoped to this domain with specific indicators and thresholds.

Indicators (Disaster-Specific):

Indicator	Data Source	Threshold	Routing Outcome
Event magnitude	IMD (earthquake/cyclone intensity); CWC (flood water levels)	>6.0 magnitude; >cyclone category 3; >flood warning level	National (NDRF pre-positioning; central fund release)
State capacity	SDMA operational readiness; previous response times	<72 hours to initial deployment	State (state-led coordination with national support)
Vulnerable population density	Census 2011 (updated via NFHS), district-level disability data	>30% population in high-risk category	District (local knowledge required for evacuation)
Informal network capacity	Civic Value Registry (pilot data)	>50 households with verified community care capacity	Community (trust-based coordination; self-help groups activated)
Infrastructure damage	ISRO satellite imagery; NDMA damage assessment	>50% road connectivity loss	State (infrastructure coordination required)
Geographic scope	District boundaries; multi-district impact	>3 districts affected	National (coordinated multi-state response)

Routing Matrix (Illustrative):

Indicator Combination	Routing Outcome
High event magnitude + multi-district scope	National (NDRF central coordination)
Moderate event magnitude + high state capacity	State (SDMA-led; national observer)
Localized flooding + high vulnerable population density	District (DM-led; national resources routed through district)
Low infrastructure damage + high informal network capacity	Community (SHG-led; minimal formal intervention)

Dynamic routing: As conditions change (e.g., floodwaters rise, new districts affected), the GSI re-diagnoses every 6 hours and updates routing assignments. Resources flow to the scale that can act most effectively.

3.2. The Civic Value Registry: Informal Economy Visibility

The Indian informal economy employs approximately **85% of the workforce**—a figure derived from ILO estimates (2023) and NSSO PLFS data (2021-22) that consistently show informal employment between 80-90% depending on definition (agricultural labor, street vendors, domestic workers, construction laborers, gig workers).

Why informal workers would participate voluntarily:

Incentive	Mechanism
Disaster relief	Verified reputation fast-tracks relief distribution during crises
Credit access	Reputation score enables micro-loans from formal lenders without collateral
Market access	ONDC participation requires trust; reputation provides it
Skills verification	Diksha integration for training credentials
No surveillance	Zero-knowledge proofs ensure raw data never leaves user control
No welfare exclusion	Registry functions without Aadhaar linkage; authentication via phone number, community vouching, or Aadhaar (optional)

Authentication Options (Addressing Aadhaar Trust Issues):

Method	Use Case
Phone number + PIN	Primary authentication; works without Aadhaar
Community vouching	For users without consistent phone access; trusted community member attests
Aadhaar (optional)	For users who prefer it; explicitly not required
Biometric (optional)	For users with Aadhaar-enabled devices; not required

Explicit Safeguard: The Civic Value Registry cannot be used for welfare exclusion or taxation enforcement. This is a non-negotiable architectural constraint, coded into the protocol's terms of use and governance structure.

What the registry measures:

- Trust networks (who trades with whom, frequency, reliability)
- Community care capacity (informal eldercare, childcare networks)
- Local adaptive resilience (how communities respond to shocks)
- Informal credit relationships (chamas, VSLAs, rotating savings groups)

3.3. The Routing Protocol

The Routing Protocol translates GSI diagnosis into resource flows:

Layer	Function	Disaster Response Example
National	Budget allocation, military deployment, satellite imagery	NDRF pre-positioning; central funds released via SDRF
State	Infrastructure coordination, public health response	State disaster management authority activates
District/Block	Local knowledge, vulnerable population mapping	District magistrate directs resources using GSI-identified priorities

Layer	Function	Disaster Response Example
Community	Trust-based coordination	Self-help groups activate informal networks; verified reputation scores fast-track relief

4. Deployment Model: Single-Domain First

Phase 1: Disaster Response (12–18 months)

Pilot State Selection:

State	Rationale
Odisha	High disaster vulnerability (cyclones); strong administrative capacity; BJP-governed (since 2024) – center-aligned; proven disaster management infrastructure (Odisha Disaster Rapid Action Force)
Gujarat	High disaster vulnerability (earthquakes, cyclones); strong administrative capacity; BJP-governed; existing digital infrastructure (e-governance leadership)

Why these states: Both are center-aligned, removing partisan optics. Odisha's disaster management infrastructure is among India's best; Gujarat's administrative capacity is proven. Success here demonstrates utility for the center's own priorities.

Triangular Activation:

Leg	Role	Partner
Foundation Anchor	Technical architecture, implementation	EkStep Foundation (primary)
Government Anchor	Policy authority, data access	NITI Aayog, NDMA, State Disaster Management Authorities
Civic-Tech Builder	Smartphone/USSD deployment, local capacity	Local civic-tech ecosystem; potential engagement with Wadhvani AI

Cost Estimate (Phase 1):

Category	Estimated Cost (₹ crore)	Notes
Technical development	₹8–12 crore	Smartphone app, USSD interface, backend infrastructure, ZK proof implementation
Pilot deployment (2 states)	₹6–10 crore	Field coordination, training, local capacity building, 12 months operational costs
Monitoring & evaluation	₹2–4 crore	Independent evaluation, metric tracking, data validation
Contingency	₹4–6 crore	20% buffer for unforeseen costs
Total	₹20–32 crore	18-month pilot

Potential Funding Sources:

- NDMA innovation budget
- PM's Science, Technology & Innovation Advisory Council (PM-STIAC)
- National Disaster Response Fund (NDRF) research allocation
- Philanthropic matching (e.g., EkStep Foundation)

Success Metrics:

Metric	Baseline	Target	Measurement
Disaster response latency	72+ hours (CAG Audit Report No. 15 of 2021)	<24 hours for GSI-routed resources	Timestamp tracking; NDMA operational logs
Vulnerable population coverage	Unknown (no baseline)	80% of identified vulnerable populations reached	GSI-identified vs. actual reach
Informal worker registry	0 (formal systems)	100,000 voluntarily registered	Registry adoption

Metric	Baseline	Target	Measurement
NDMA integration	None	GSI outputs used in NDMA operational planning	Integration agreements

Phase 2: Welfare Delivery (Years 2–3)

- GSI applied to PM-KISAN, NFSA, MGNREGA targeting
- Pilot states expanded to include Tamil Nadu (DMK) and Uttar Pradesh (BJP) to demonstrate bipartisan utility
- Civic Value Registry integrated into welfare eligibility algorithms (with exclusion safeguards)

Phase 3: Agricultural Policy (Years 4–5)

- GSI integrated into Ministry of Agriculture planning
- State-level agricultural extension redesigned based on GSI diagnosis
- ONDC integration for market access based on reputation scores

5. Technical Specifications

Component	Specification
Primary access	Smartphone app (Android/iOS) with USSD fallback (India's smartphone penetration ~75%, USSD for remainder)
Offline support	Local mesh sync via Bluetooth; updates when network available
Cryptography	BLAKE3 hashing; incremental ZK-SNARKs for reputation proofs
Authentication	Phone number + PIN (primary); community vouching (secondary); Aadhaar optional
DPI integration	UPI chaining; DEPA consent; DigiLocker storage; Aadhaar optional

Component	Specification
Language support	22 scheduled languages; voice prompts for low-literacy users
Data sources	IMD (event magnitude); CWC (flood levels); ISRO (satellite imagery); NDMA (damage assessment); SDMA (state capacity); Census/NFHS (vulnerable populations)

6. Privacy & Data Sovereignty

DPI 2.0 inherits India Stack's data sovereignty principles and aligns with the *Justice K.S. Puttaswamy v. Union of India* (2017) privacy ruling:

Principle	Implementation
User ownership	Reputation data owned by the individual; controlled via DEPA
Zero-knowledge proofs	Users prove "I have Level 4 reliability" without revealing transaction history
No central repository	Raw data remains at the edge; central system holds only anonymized aggregates
Voluntary participation	No mandatory registration; formal actors can ignore protocol
Consent architecture	DEPA-based consent; users approve each data disclosure
Aadhaar optional	Registry functions without Aadhaar linkage; addresses welfare exclusion concerns

Explicit Safeguard: The Civic Value Registry cannot be used for welfare exclusion or taxation enforcement. This is a non-negotiable architectural constraint, coded into the protocol's terms of use and governance structure, with independent oversight to ensure compliance.

7. Risk Mitigation

Risk	Mitigation
Political perception as decentralization challenge	Frame as disaster response latency solution; center gets measurable outcomes; pilot states center-aligned
Informal worker distrust (Aadhaar shadow)	Aadhaar optional; phone number + PIN primary authentication; explicit welfare exclusion prohibition; no mandatory registration
State resistance	Voluntary participation; single-domain first (disaster response); demonstrate utility before expansion
Privacy violation	ZK proofs; user-controlled disclosure; no central repository; constitutional alignment
Regulatory capture	Distributed governance; civil society observers; parliamentary oversight
Scale failure	Phased deployment; single-domain first; continuous evaluation; algorithmic triggers
Cost overruns	Phased funding; contingency allocation; transparent accounting

8. Alignment with Existing Frameworks

Framework	Alignment
India Stack	Built on top of; extends with governance routing
NITI Aayog Mandate	Provides technical inputs; does not replace political decision-making
Digital India	Advances next phase of digital transformation
National DPI Framework	Adds missing governance layer
Sendai Framework for Disaster Risk Reduction	Directly operationalizes disaster response targets (Target D: reduce disaster damage)

Framework	Alignment
UN Sustainable Development Goals	Advances SDG 1 (poverty), 11 (sustainable cities), 13 (climate)

9. Immediate Next Steps

Timeline	Action	Partner
Month 1–2	Technical validation workshop; GSI indicator refinement with NDMA	EkStep Foundation, NDMA
Month 3–4	Pilot state engagement (Odisha, Gujarat)	NITI Aayog, State Disaster Management Authorities
Month 5–6	Smartphone prototype development; USSD fallback; authentication pathways	Civic-tech developers
Month 7–12	Pilot deployment + metric tracking	State governments, NDMA
Month 13–18	Evaluation + scaling blueprint	EkStep, NITI Aayog

10. Conclusion: From Plumbing to Intelligence

India has built the digital pipes. Now it needs the **governance intelligence** to route resources through those pipes to the places they are most needed.

DPI 2.0 is not a political argument for decentralization. It is a **technical solution to measurable governance problems**:

- Disaster response latency kills people. DPI 2.0 reduces it.
- Welfare targeting wastes resources. DPI 2.0 improves it.

- Agricultural distress destroys livelihoods. DPI 2.0 mitigates it.

What the center gains:

- Measurable outcomes (lives saved, resources optimized)
- Strategic visibility (informal economy data that doesn't exist today)
- Electoral accountability (visible results, not process)

The plumbing is ready. The intelligence is ready. It is time to route.