Survey Report: Types of Blockchains and Real-Time Use Cases

Summary

Blockchain is a family of distributed-ledger technologies that record tamper-resistant transactions across multiple nodes. There are four widely accepted types of blockchain networks — public, private, consortium, and hybrid — and each is optimized for different governance, privacy and scalability trade-offs. Choosing the right type is primarily driven by who must participate, the required confidentiality of transactions, and throughput/latency needs.

This report explains each type, compares their technical and governance properties, and surveys high-impact, real-time (production or near-production) use cases across finance, supply chain, healthcare, identity, energy, and public services, with concrete platform examples.

1. Types of blockchains — definitions & core properties

1.1 Public (permissionless) blockchains

Definition: Open networks where anyone can read, write, and participate in consensus (e.g., Bitcoin, Ethereum mainnet).

Properties: High decentralization and transparency; censorship-resistant; typically permissionless; often use energy- or stake-based consensus; generally lower throughput and higher latency vs permissioned systems. (Investopedia)

Where used: Cryptocurrencies, public tokens, open DeFi protocols, public NFTs.

1.2 Private (permissioned) blockchains

Definition: Single-organization controlled ledgers where reading/writing is restricted to authorized nodes.

Properties: Strong access control, higher transaction rates, configurable privacy, centralized governance (one org). Suited where confidentiality and higher performance matter. (Blockchain Council)

Where used: Internal asset registries, inter-departmental record keeping, enterprise data sharing.

1.3 Consortium (permissioned multi-party) blockchains

Definition: Semi-private networks governed by a group (a consortium) of organizations rather than a single entity (e.g., banking consortiums using R3 Corda, IBM Food Trust as a supply-chain consortium).

Properties: Balanced decentralization among vetted participants, improved privacy compared to public chains, often optimized for enterprise legal/compliance needs. Common in finance and cross-industry workflows. (kaleido.io)

Where used: Trade finance, interbank settlements, shared supply-chain ledgers.

1.4 Hybrid blockchains

Definition: Architectures that combine public and private sections — e.g., sensitive data remains on a private layer while hashes or selective records are anchored publically.

Properties: Tailored access control, selective transparency; useful when public auditability is required without full data disclosure. (paxos.com)

Where used: Government identity systems with public verification of anchors, enterprise registries that publish attestation proofs.

2. Technical comparison (short)

Characteristic	Public	Private	Consortium	Hybrid
Consensus model	PoW/PoS/etc. (open)	PBFT variants, RAFT	PBFT/Corda-style	Mixed
Governance	Open, decentralized	Single org	Multi-org	Mixed
Privacy	Low (public)	High	High	Configurable
Scalability	Lower	High	High	Depends
Typical use	Tokens, open dApps	Internal apps	Cross-org business apps	Mixed needs

3. Real-time / production use cases (industry by industry)

Finance & Banking

- Cross-border payments & settlements: Blockchains reduce settlement time and intermediaries. Public DeFi rails (e.g., stablecoins) and consortium solutions (R3 Corda, Hyperledger Fabric) are used for faster interbank clearing and tokenized assets. (Consensys - The Ethereum Company)
- Trade finance and letters of credit: Banks use consortium ledgers to share document provenance, reduce fraud and speed up trade financing processes (R3, and pilot networks by several banks). (kaleido.io)

Supply chain & provenance

- Real-time tracking and provenance: Platforms like IBM Food Trust (Hyperledger-based) store events from producers to retailers to prove origin, timestamps, and immutability — enabling near-real-time recalls and authenticity checks. (Flashift)

Healthcare

- Patient data interoperability & consent: Permissioned ledgers can log consent, access events and hashed pointers to encrypted records so authorized providers can share data while preserving privacy and traceability. (webisoft.com)

Digital identity & credentials

- Decentralized Identifiers (DIDs) and verifiable credentials: Hybrid or permissioned ledgers anchor identity claims (public anchors + private claims). (Consensys - The Ethereum Company)

Energy & IoT

- Peer-to-peer energy trading: Microgrid pilots use permissioned or hybrid blockchains to record energy production/consumption and enable automated settlement between prosumers. (webisoft.com)

Government & voting

- Land registries, public records, voting pilots: Permissioned/hybrid models are favored because of privacy and legal trace needs. (paxos.com)

Enterprise recordkeeping

- Shared KYC, supplier onboarding, auditing: Consortium blockchains reduce duplication for repetitive, multi-party workflows. (kaleido.io)

10. Conclusion

Different blockchain types solve different problems — there is no one-size-fits-all. The key is to match the network type to your trust model, privacy and regulatory requirements, and performance needs. Many real-world, real-time solutions already run on production or near-production networks; the pragmatic route for most enterprises is pilot → consortium or hybrid deployment rather than an immediate move to public mainnets.