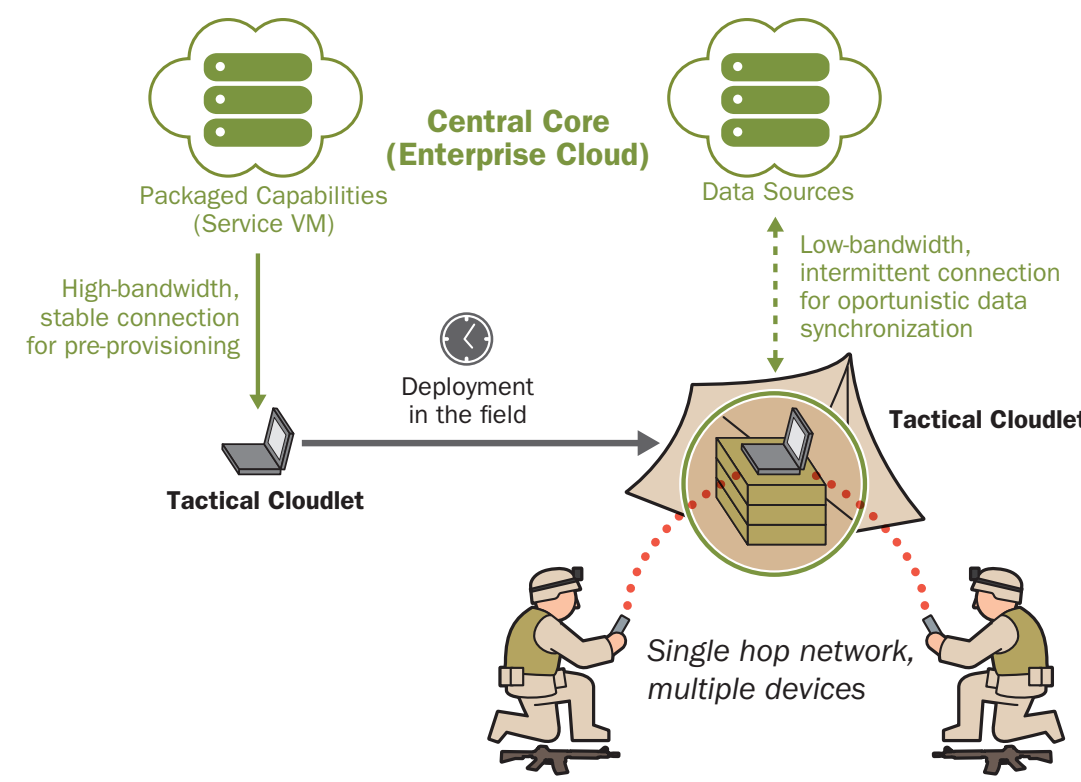


Tactical Computing and Communications (TCC)

Secure and Efficient Computing and Communications at the Edge

Previous Work Tactical Cloudlets



Forward-deployed, discoverable, virtual machine (VM) based cloudlets that can be hosted on vehicles or other platforms

- computation offload
- forward data-staging
- filtering of data intended for mobile devices
- collection points for data heading for enterprise repositories

- Features:**
- Pre-Provisioned Cloudlets w/ App Store
 - Standard Packaging of Service VMs
 - Optimal Cloudlet Selection
 - Cloudlet Management Console
 - Cloudlet Handoff/Migration
 - Secure Key Generation and Exchange

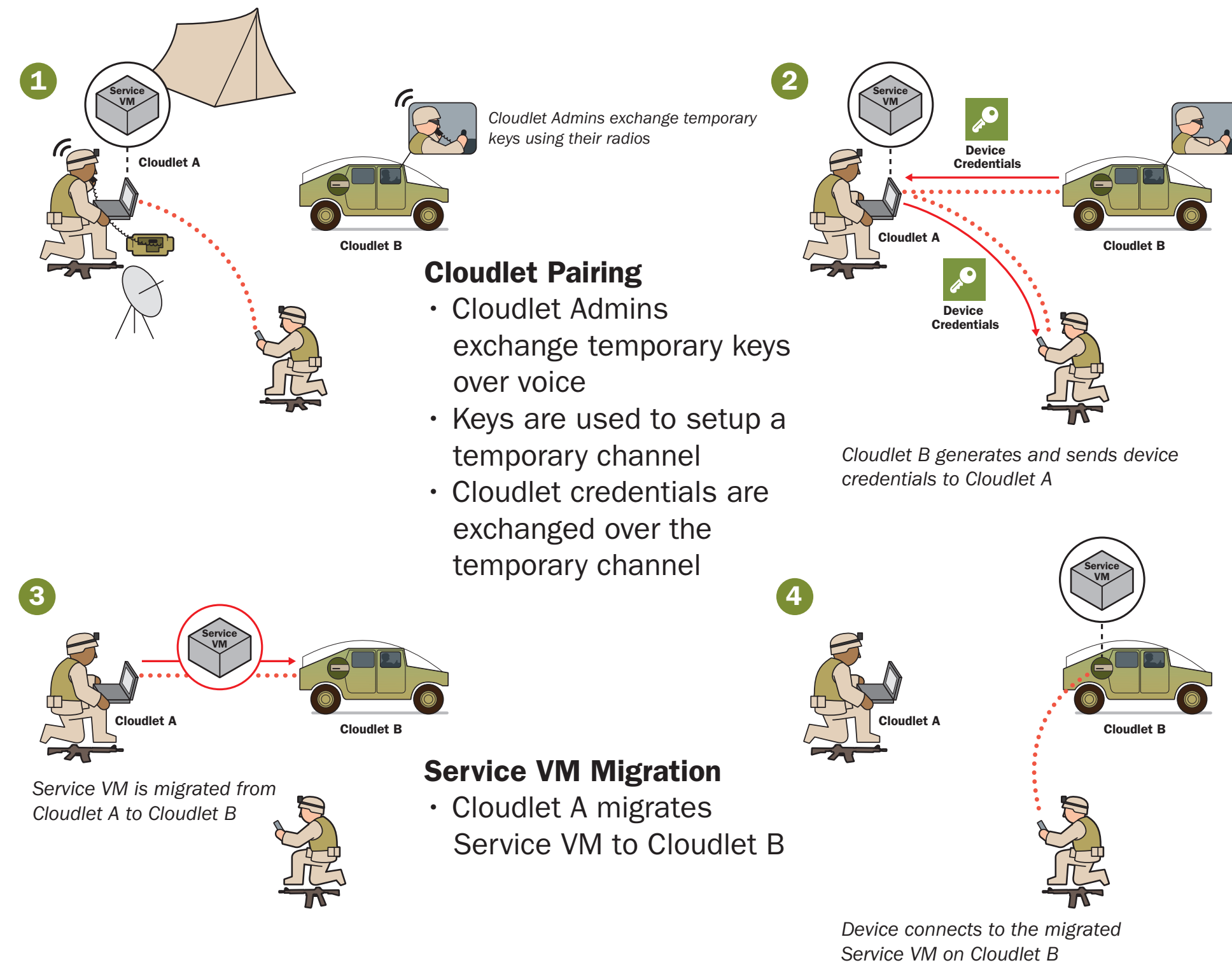
Delay-Tolerant Networking (DTN)

	Connected	Disconnected	Reconnecting
GOALS	Maintain shared group context Make best use of available bandwidth	Applications continue to function Predict state where possible	Re-establish shared group context as quickly and accurately as possible
DTN NODE TASKS	Pre-cache data likely to be relevant later in the mission Delay transmission of non-critical data	Predict location of teams based on mission plan Provide connectivity map to help the user reconnect	Prioritize synchronization of critical messages Eliminate redundant messages

Extensions to the existing DTN standard for priorities, staleness, replacement, and redundancy monitoring to increase bandwidth efficiency in DIL environments

- Metadata**
- Time and location Priority
 - Type of payload (image, voice, video, text, ...)
 - Set of tags describing payload content (building, crowd, fire, injured person, ...)

Secure Service VM Migration

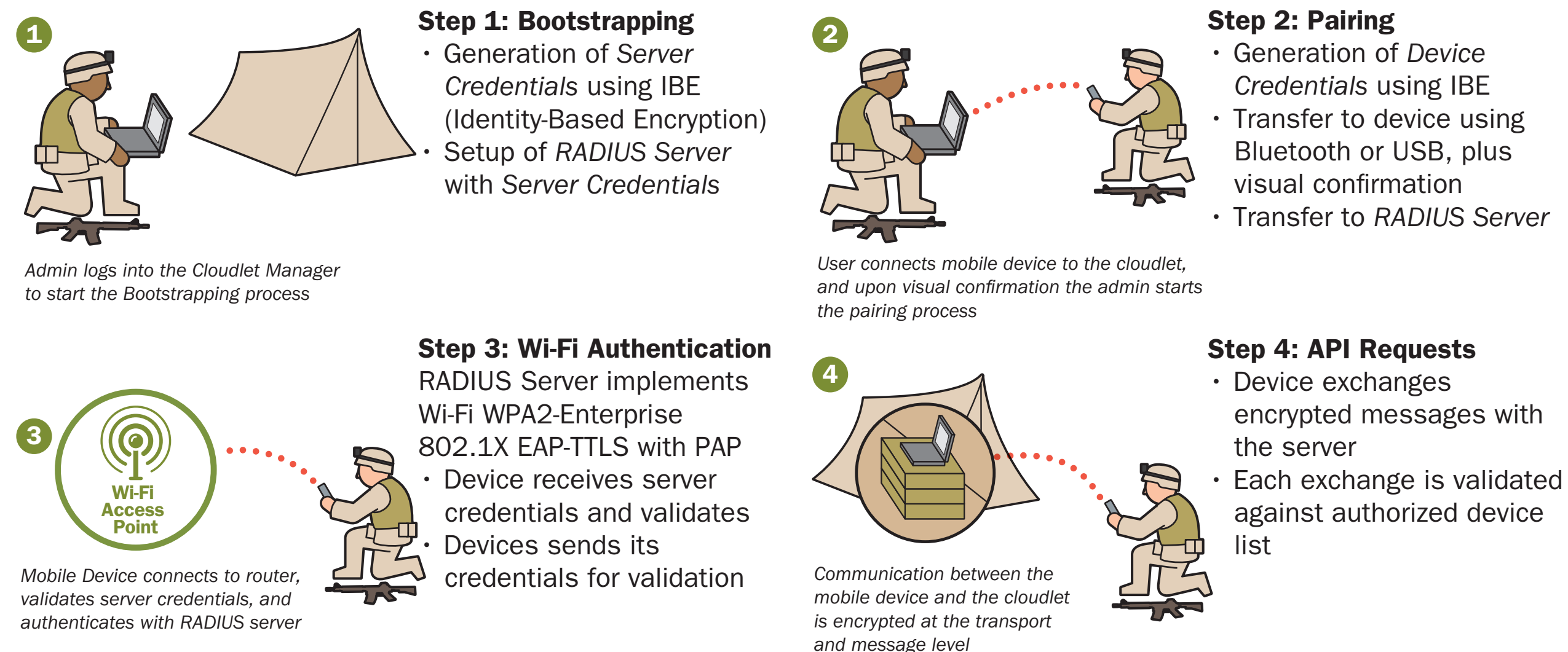


- Cloudlet Pairing**
- Cloudlet Admins exchange temporary keys over voice
 - Keys are used to setup a temporary channel
 - Cloudlet credentials are exchanged over the temporary channel

- Service VM Migration**
- Cloudlet A migrates Service VM to Cloudlet B

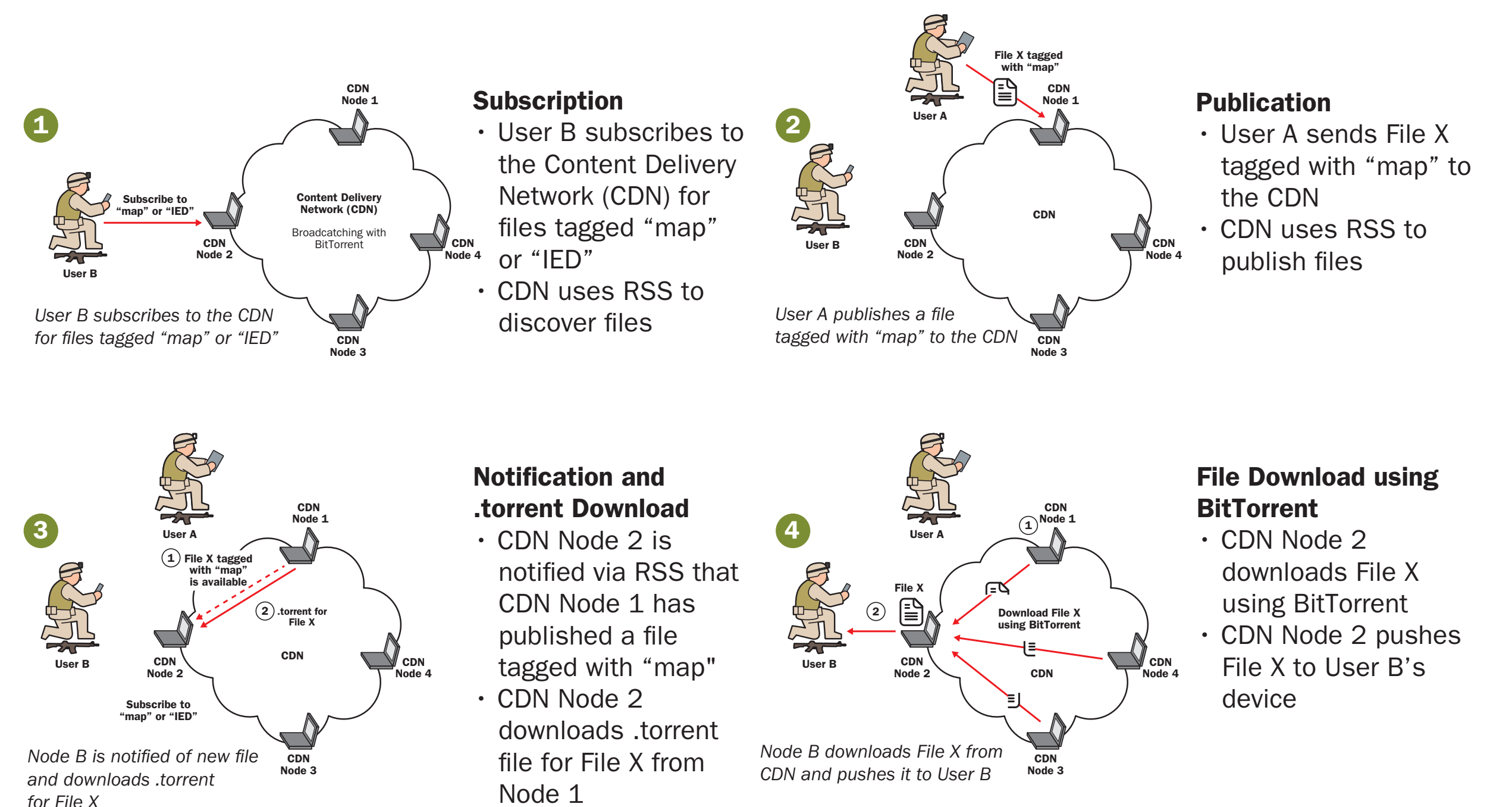
- Device Credential Generation**
- Cloudlet A discovers and connects to Cloudlet B using exchanged credentials
 - Cloudlet B generates new credentials for Device
 - Cloudlet B sends credentials to Device via Cloudlet A
- Device Connection**
- Device connects to Cloudlet B using new credentials
 - Client App on Device connects to Service VM running on Cloudlet B

Trusted Identities in Disconnected Environments



- Device Credential Revocation**
- Automatic due to timeout: Bootstrapping requires setting up mission length
 - Manual due to known loss or compromise: Cloudlet Manager component has revocation option

Delay-Tolerant Data Sharing



- File Download using BitTorrent**
- CDN Node 2 downloads File X using BitTorrent
 - CDN Node 2 pushes File X to User B's device