Delivering EDU digital content to the Unconnected

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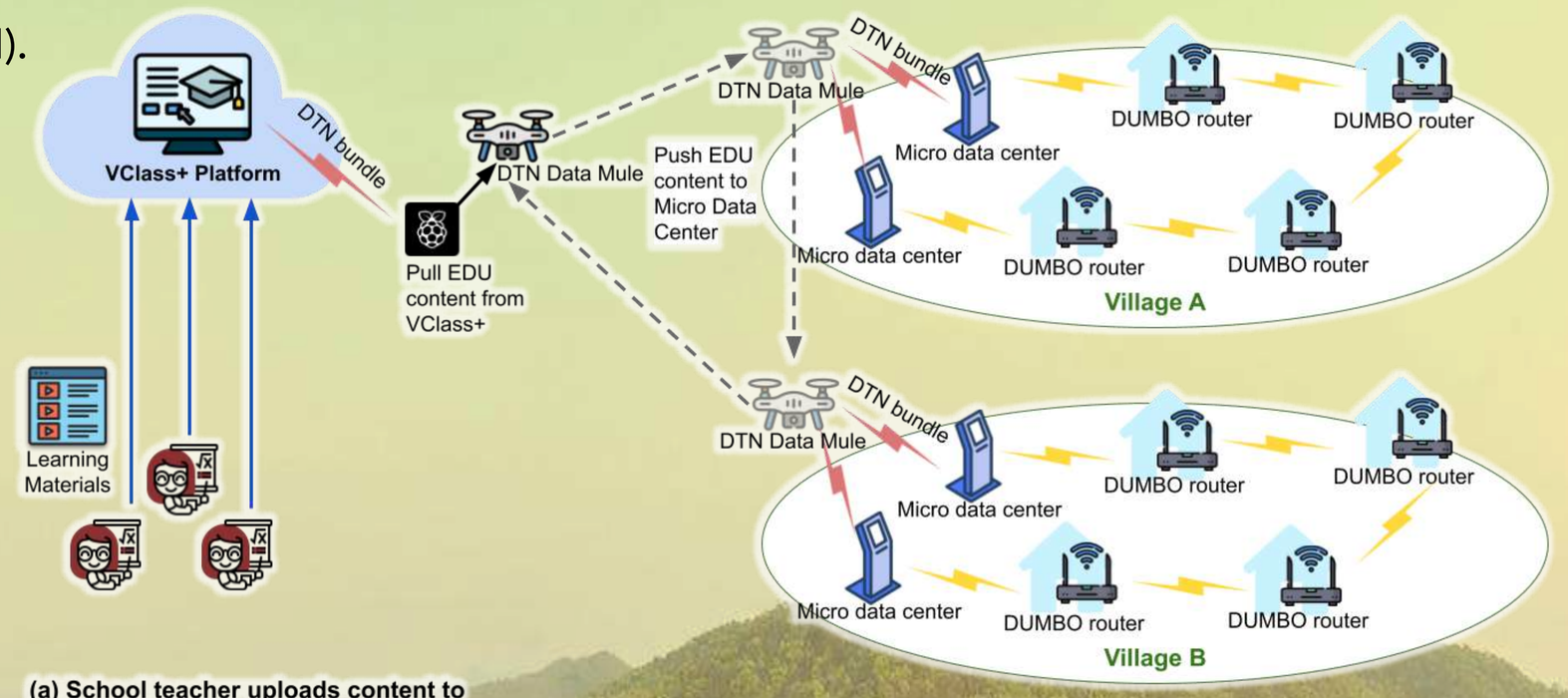
Many villages remain without Internet access or suffer from unstable connectivity, isolating local learners and teachers from modern education and communication. We designed a content delivery network (CDN) for educational (EDU) content to bridge this digital gap, enabling unconnected communities to access and exchange learning materials in a remote classroom-like environment with two-way communication. The system integrates available technologies such as Unmanned Aerial Vehicle (UAV), Wi-Fi mesh routers, mobile devices, and distributed Micro data centers, enhanced by Delay Tolerant Networking (DTN).

Content creator

- Teachers upload lessons, multimedia, and homework materials to **VClass+** an educational cloud platform. central
- EDU content is pre-downloaded, packaged into DTN bundles to be forwarded to UAVs for distribution.

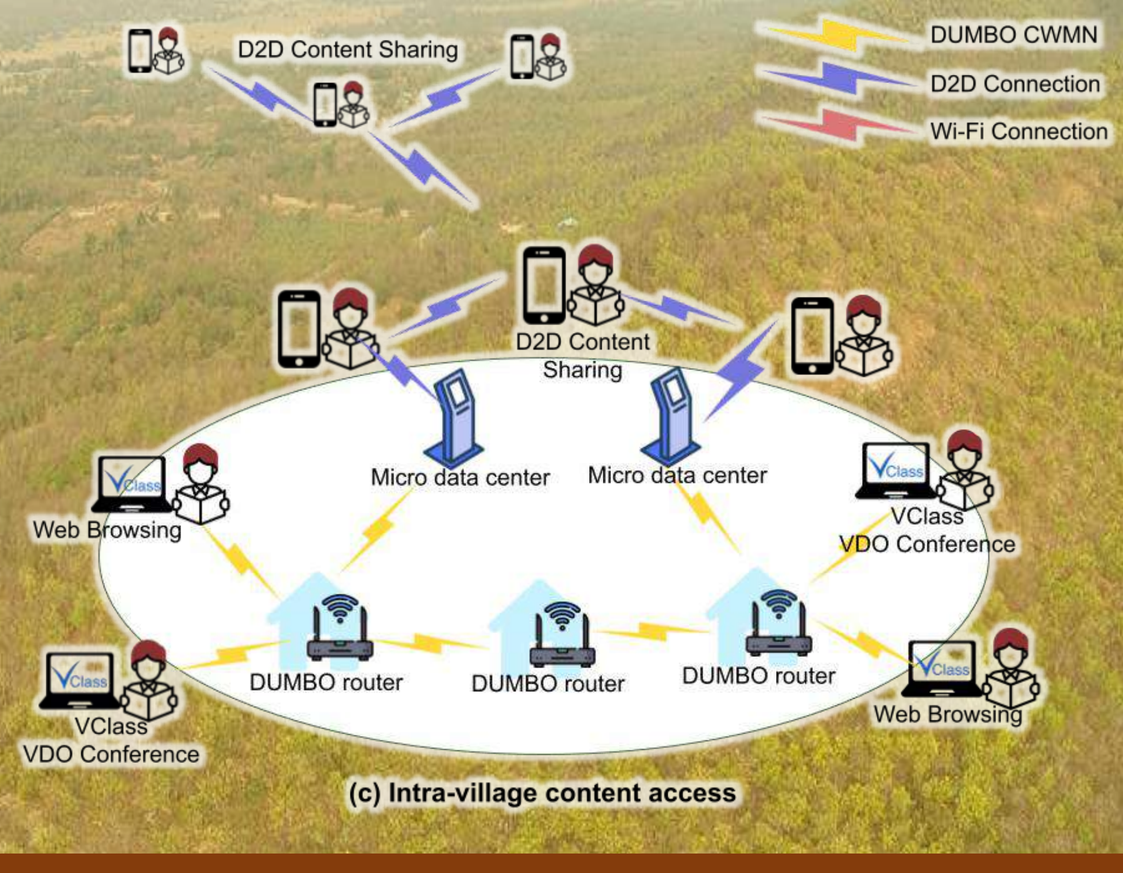
Content Delivery on DTN

- **UAV** with Raspberry Pi acts as DTN data mule for remote areas.
- Routinely fly on set routes between Internet hubs and village micro data centers.
- Deliver EDU bundles from VClass+ and collect homework/data via wireless links.



(a) School teacher uploads content to EDU platform

(b) Drone drops EDU content bundles to micro data centers



(c) Intra-village content access

Intra-Village CDN

- **Micro data centers** serve as local EDU servers with storage, Wi-Fi, and Device-to-Device (D2D) links. It exchanges bundle with UAV, synchronize and maintain complete content libraries and services
- **Wi-Fi Mesh network** connect Micro data centers, homes, and devices via multi-hop routing.
- **User devices** (phones, tablets) access the content via mesh and act as mobile caches through D2D sharing.

Content and Services

- **Web access**: Cached EDU websites on Micro data centers with local DNS and homework collection via UAV.
- **Video sharing**: Download and exchange EDU videos via D2D links.
- **VClass conferencing**: Local group learning and discussions hosted on local micro data centers.
- **Email Service**: Micro data center acts as a proxy mail server for local users and exchanging emails to internet via UAV.



Children, teachers, and villagers in Doi Sai Mai, Tak, Thailand — representing rural communities in this proposed EDU network concept.

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Supported by NET2HOME
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