Swimlane Activity Diagram - Gateway-Aware Opportunistic Mesh Communication System

User	Mesh Node App	Gateway Node	Cloud Backend (AWS/Azure)	Cloud Database	Admin Dashboard

User
- Launch App
- Compose Message
- Send Message to Mesh Node

Mesh Node App
- Check Nearby Peers
- Peer Found? — Yes / No
  - Yes: Send Message via Bluetooth/Wi-Fi Direct
  - No: Store Message Locally
- Check Device Role / Gateway Capability
- Device Acts as Gateway? — Yes / No
  - Yes: Promote Node to Gateway Role
  - No: Continue Normal Mesh Mode

Gateway Node
- Internet Available? — Yes / No
  - Yes: Upload Stored Messages
  - No: Wait for Internet Availability

Cloud Backend (AWS/Azure)
- Receive Messages via REST API
- Store in Cloud Database
- Send Acknowledgment to Gateway
- Retrieve Pending Messages
- Return Messages to Gateway

Cloud Database
- Save Messages
- Fetch Stored Messages

Gateway Node
- Poll for New Messages
- Inject Messages into Local Mesh

Mesh Node App
- Deliver to Destination User

User
- Receive Message and View Notification

Admin Dashboard
- Monitor Logs & Gateway Activity