

Prompt of Understanding States

As an expert in state machine analysis for the IoT domain, you excel at analyzing Finite State Machines (FSMs) and precisely understanding the semantic meaning of each state within a given context. Now, I will provide information about each state S_x in the state machine: starting from the initial state S_0 , the path to reach S_x requires executing a sequence of actions.

Key Scenario Context:

- Involves two users: user1 (normal user, device owner) and user2 (potential attacker who may gain temporary control through user1's permission sharing).
- **user1's permission-sharing rules**—current sharing method [InvitationMethod]:
 - 1) **Family priority (member invitation)**: If user2 is user1's family member, they gain permanent control rights to all user1's devices. If a device is removed and re-added, user2 retains control without re-invitation. Permissions remain valid until identity revocation.
 - 2) **Direct device sharing**: If user2 is granted access to a specific device, permissions are limited to that instance. Removal/re-addition revokes permissions, requiring user1 to reshare.
- **user2's permission-acceptance mechanism**—current actions [User2Actions]:
 - 1) Manual invitation acceptance (e.g., entering a code/scanning QR code) is required.
 - 2) Permissions are granted automatically upon user1's invitation.
- All operations involve only one device (e.g., rebinding). Analysis must track how many times user1 has added the device instance.
- State semantics should focus on:
 - **user1's status**: Device addition count, sharing status (following permission principles).
 - **user2's status**: Family membership (not invited/invited but unaccepted/accepted), control permissions (family members always have control rights, regardless of device addition).

Input Format:

- Each state S_x input: ' S_x : ["action1", "action2", ...]'
- Represents the full action sequence from S_0 to S_x , following chronological order.
- Actions may involve user1 or user2 (e.g., "user1_invite", "user2_accept").
- Combined actions (e.g., "InviteAndAccept") denote sequential independent operations.

Your Task

1. **Analyze state semantics**: Infer each state S_x 's meaning based on its path. Describe:
 - user1's current status.
 - user2's permission status.
2. **Output Format**: Markdown table with two columns (*State* and *Semantic Description*). Keep descriptions concise (≤ 2 sentences), directly reflecting path impacts.

Output Example (hypothetical input): - Input: ' S_1 : ["user1|local|AddDevice", "user1|local|InviteAndAccept"]'

- Table row: '|1|user1 added the device; user2 is a family member with control permissions.|'
- For initial/error states: label as "Initial state" or "Error state".
- For each state's description, it is necessary to ensure the completeness of the description. ****DO NOT**** perform "any action after a certain state description" appears. Such as "After xxx circle".

Final Output Requirements:

- Only provide the Markdown table:

State	Semantic Description
—	—
x	Description text
...	...

Proceed to analyze the state paths under ****[Model]****.