

$s?$ is for sender and $r?$ is for receiver.

RequestFriend $\Delta \text{UserManager}$ $s? : \text{User}$ $r? : \text{User}$
$r? \notin \text{UserFriends } s?$ $\text{UserFriendStatus}' = \text{UserFriendStatus} \cup \{s?, r?\} \mapsto \text{RequestSent}$ $\text{UserFriendStatus}' = \text{UserFriendStatus} \cup \{r?, s?\} \mapsto \text{RequestReceived}$ $\text{UserFriends}' s? = \text{UserFriends } s? \cup \{r?\}$ $\text{UserFriends}' r? = \text{UserFriends } s? \cup \{s?\}$

FriendResponse $\Delta \text{UserManager}$ $s? : \text{User}$ $r? : \text{User}$ $\text{response?} : \text{Bool}$
$\text{UserFriendStatus}\{r?, s?\} = \text{RequestReceived}$ $(\text{response?} = \text{True} \wedge$ $\quad \text{UserFriendStatus}'\{r?, s?\} \mapsto \text{confirmed} \wedge$ $\quad \text{UserFriendStatus}'\{r?, s?\} \mapsto \text{confirmed})$ $\vee (\text{UserFriendStatus}'\{r?, s?\} \mapsto \emptyset \wedge$ $\quad \text{UserFriendStatus}'\{r?, s?\} \mapsto \emptyset \wedge$ $\quad \text{UserFriends}' s? = \text{UserFriends } s? \setminus \{r?\} \wedge$ $\quad \text{UserFriends}' r? = \text{UserFriends } r? \setminus \{s?\})$

RequestRendezvous $\Delta \text{UserManager}$ $\Delta \text{ParcelManager}$ $s? : \text{User}$ $r? : \text{User}$ $p? : \text{Parcel}$
$\text{UserFriendStatus}\{r?, s?\} = \text{Confirmed}$ $p? \in \text{UserParcels } s?$ $\text{ParcelStatus } p? = \text{Uninitiated} \vee \text{ParcelStatus } p? = \text{WithCourier}$ $\text{ParcelStatus}' p? = \text{RendezvousRequested}$

<i>RendezvousResponse</i>
$\Delta UserManager$
$\Delta ParcelManager$
$s? : User$
$r? : User$
$p? : Parcel$
$response? : Bool$
$UserFriendStatus\{r?, s?\} \mapsto confirmed$ $p? \in UserParcels\ s?$ $p? \in UserParcels\ r?$ $(response? = True \wedge ParcelStatus'\ p? = RendezvousAccepted) \vee$ $((ParcelCarrier\ p? = ParcelSource\ p? \wedge ParcelStatus'\ p? = Uninitiated) \vee$ $(ParcelStatus'\ p? = WithCourier))$

<i>FinalizeExchange</i>
$\Delta UserManager$
$\Delta ParcelManager$
$s? : User$
$r? : User$
$p? : Parcel$
$UserFriendStatus\{r?, s?\} \mapsto confirmed$ $p? \in UserParcels\ s?$ $UserParcels'\ s? = UserParcels\ s? \setminus \{p?\}$ $UserParcels'\ r? = UserParcels\ r? \cup \{p?\}$ $(ParcelDestination\ p? = r?$ $\quad \wedge ParcelStatus'\ p? \mapsto completed)$ $\vee ParcelStatus'\ p \mapsto WithCourier$

<i>InitiateCourier</i>
$\Delta UserManager$
$\Delta ParcelManager$
$s? : User$
$r? : User$
$p? : Parcel$
$!courier : User$
$UserFriendStatus\{r?, s?\} \mapsto confirmed$ $\exists c : User \in (UserFriends\ s? \cap UserFriends\ r? \wedge$ $\quad UserFriendStatus\{r?, c?\} = confirmed \wedge UserFriendStatus\{s?, c?\} = confirmed \wedge$ $\quad UserCourier\ c? = True)$ $p? \in UserParcels\ s?$ $ParcelStatus\ p? \mapsto uninitiated$ $UserParcels'\ r? = UserParcels'\ r? \cup \{p?\}$ $!courier = u1 : User \in (UserFriends\ s? \cap UserFriends\ r?) \wedge$ $\quad UserCourier\ u1 = True \wedge UserFriendStatus\{r?, u1\} = confirmed \wedge$ $\quad UserFriendStatus\{s?, u1\} = confirmed \wedge$ $\quad (\forall u2 : User \in (UserFriends\ s? \cap UserFriends\ r?) \wedge$ $\quad \quad UserCourier\ u2 = True \wedge UserFriendStatus\{r?, u2\} = confirmed \wedge$ $\quad \quad UserFriendStatus\{s?, u2\} = confirmed \wedge$ $\quad \quad UserDistance\{s?, u1, r?\} \leq UserDistance\{s?, u2, r?\})$

<i>IsFriendWith</i>
$\Delta UserManager$
$s? : User$
$r? : User$
$res! : Bool$
$res! = UserFriendStatus\{r?, s?\} \mapsto confirmed$

<i>IsRatable</i>
$\Delta UserManager$
$s? : User$
$r? : User$
$res! : Bool$
$res! = (UserFriendStatus\{r?, s?\} \mapsto confirmed \wedge$ $\quad r? \text{ in } UserRatable\ s?)$

<i>Rate</i>	
$\Delta UserManager$	
$s? : User$	
$r? : User$	
$up? : Bool$	
	$UserFriendStatus\{r?, s?\} \mapsto confirmed$ $r? \text{ in } UserRatable\ s?$ $(up? = True \wedge UserRating'\ r? = UserRating\ r? + 1) \vee$ $(UserRating'\ r? = UserRating\ r? - 1)$ $UserRatable'\ s? = UserRatable'\ s? \cup \llbracket r? \rrbracket$