$$\begin{tikzcd} \mathcal{F} \arrow[r, "\theta"] \arrow[dr, "\varphi"'] & \mathcal{F}^+ \arrow[d, "\psi", "?"'] \\ & \mathcal{G} \end{tikzcd}$$

Define $\psi : \mathcal{F}^+ \longrightarrow \mathcal{G}$ as follows;

$\psi(U) : \mathcal{F}^+(U) \longrightarrow \mathcal{G}(U)$. given $\tau \in \mathcal{F}^+(U)$

$\tau : U \longrightarrow \bigcup_{p \in U} \mathcal{F}_p$.

For each $p \in U$, $\exists\ p \in V_p \subset U$ s.t $t(p) \in \mathcal{F}(V_p)$ and for every $q \in V_p$, $t(p)_q = \tau(q)$.

$\psi(V_p)(\tau|_{V_p}) = \varphi_{V_p}(t(p))$ for each $p \in U$.

$\Rightarrow$ If $V_p \cap V_{p'} \neq \phi$, $t(p)|_{V_p \cap V_{p'}} = t(p')|_{V_p \cap V_{p'}}$

$\Big($ $\because$ $t(p') \in \mathcal{F}(V_{p'})$ $t(p')_q = \tau(q)$ $q \in V_{p'}$

$\Rightarrow$ If $q \in V_p \cap V_{p'}$, $t(p')_q = \tau(q) = t(p)_q$.

$\Rightarrow$ $t(p')|_{W_q} = t(p)|_{W_q}$ for some small nbd $W_q \ni q$.

$\Rightarrow$ $t(p') - t(p) = 0$ on W_q which covers $V_p \cap V_{p'}$. as q varies over $V_p \cap V_{p'}$.

$\Rightarrow$ By the sheaf property (i), $t(p') = t(p)$ on $V_p \cap V_{p'}$. $\Big)$

Thus by the sheaf property (ii), $\exists\ t(U) \in \mathcal{F}(V_p)$ s.t $t(U)|_{V_p} = t(p)$.

We have only to prove $\psi(U)(\tau) = \varphi(t(U))$.