For an RLC transmission line (i.e., the transverse dimensions of the conductors and their spacings are much less than the length of the conductors and the wavelength) of length l, terminated with an impedance $Z_L = R_L + j X_L$

$$Z_{in} = Z_o \frac{Z_L + Z_o \tanh(\gamma l)}{Z_o + Z_L \tanh(\gamma l)}$$

at low frequency (i.e., $l << 2\pi/\mathrm{Im}(\gamma)$, where γ is the complex propagation constant for the line) the input impedance is approximately

$$Z_{in} \cong \frac{Z_L + Z \cdot l \cdot \left(1 - \tfrac{1}{3} Z \cdot Y \cdot l^2\right)}{1 + Z_L \cdot Y \cdot l \cdot \left(1 - \tfrac{1}{3} Z \cdot Y \cdot l^2\right)}$$

$$\mathrm{Re}(Z_{in}) = \frac{R_L + \left[1 - \omega X_L C_t + \tfrac{1}{3}(\omega X_L C_t)^2\right] R_t}{(1 - \omega X_L C_t)^2}$$

$$\mathrm{Im}(Z_{in}) = \frac{X_L + \omega\left[L_t - \tfrac{1}{3} R_t^{\,2} C_t - C_t R_L (R_L + R_t) - C_t X_L^{\,2}\right]}{(1 - \omega X_L C_t)^2}$$

valid to terms up to order ω (recall limit is for small ω), where R_t, L_t, and C_t are the total resistance, inductance, and capacitance of the T-line (i.e., the per unit length values multiplied by the length l).

Special cases:

Series R-L load: $Z_L = R_L + j\omega L_L$ i.e., $X_L = \omega L$

$$\mathbf{Re}(Z_{in}) = R_L + R_t \qquad \mathbf{Im}(Z_{in}) = j\omega\left[L_t + L_L - \tfrac{1}{3}R_t^2 C_t - C_t R_L(R_L + R_t)\right]$$

Series R-C load: $Z_L = R_L + \dfrac{1}{j\omega C_L}$ i.e., $X_L = -\dfrac{1}{\omega C_L}$

$$\mathbf{Re}(Z_{in}) = \frac{R_L + \left[1 + \frac{C_t}{C_L} + \frac{1}{3}\left(\frac{C_t}{C_L}\right)^2\right]R_t}{\left(1 + \frac{C_t}{C_L}\right)^2} \qquad \mathbf{Im}(Z_{in}) = \frac{1}{j\omega(C_L + C_t)}$$

special case: for $R_L = 0$, $C_t >> C_L$, $\mathbf{Re}(Z_{in}) = \dfrac{R_t}{3}$

for $R_L = 0$, $C_t << C_L$, $\mathbf{Re}(Z_{in}) = R_t$

For π model of T-line, one lump, pure capacitor load:

$$\mathbf{Re}\left(Z_{in}^{\pi}\right) = \left(\frac{C_L + \frac{1}{2}C_t}{C_L + C_t}\right)^2 R_t \qquad \text{for } R_L = 0,\ C_t >> C_L,\ \mathbf{Re}\left(Z_{in}^{\pi}\right) = \frac{R_t}{4}$$

For tee model of T-line, one lump, pure capacitor load:

$$\mathbf{Re}\left(Z_{in}^{tee}\right) = \left(\frac{C_L^2 + \frac{1}{2}C_t^2}{C_L^2 + C_t^2}\right) R_t \quad \text{for } R_L = 0,\ C_t >> C_L,\ \mathbf{Re}\left(Z_{in}^{tee}\right) = \frac{R_t}{2}$$

both get capacitance right.