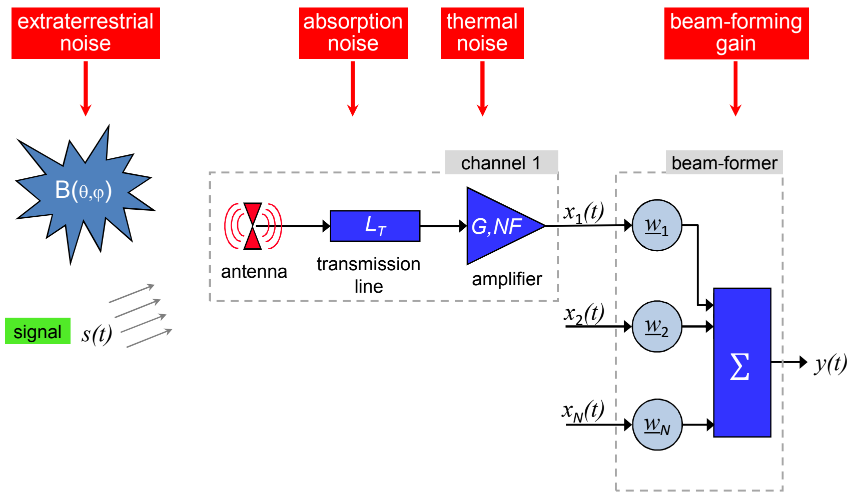
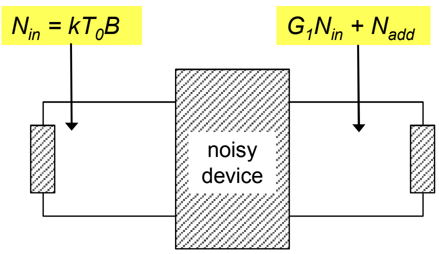
Noise in Communication Systems - Applications -

Multi-Channel Communication System

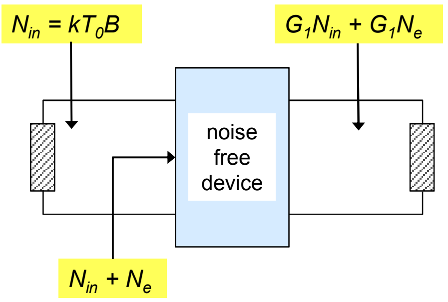


Noise Figure

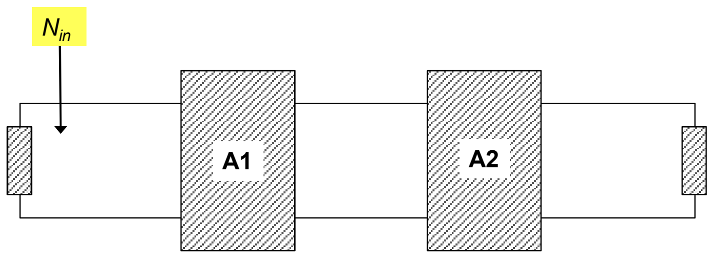
Noise Figure



Noise Figure



Noise Figure of Cascaded Devices



Universität Karlsruhe (TH)
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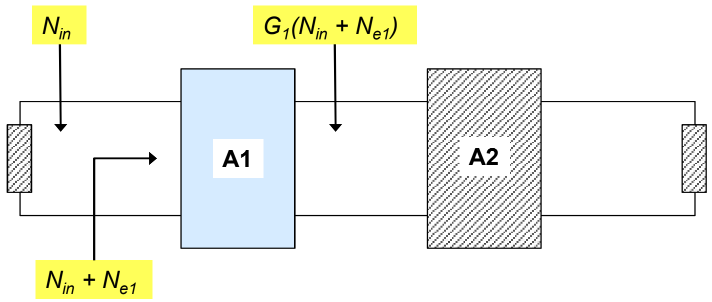
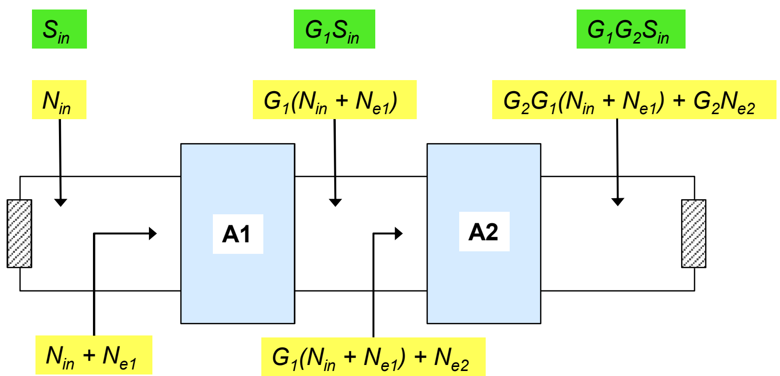
Noise Figure of Cascaded Devices



Noise Figure of Cascaded Devices



Microwave Receiver Noise Temperature

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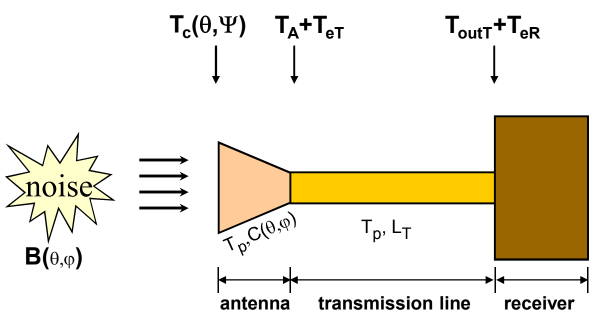
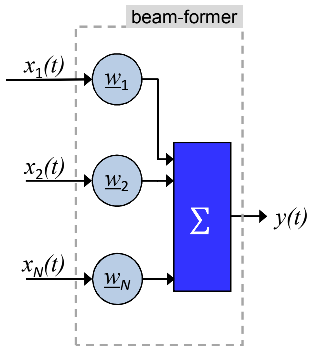


Multi-Channel Communication System

$x_i(t) = a_i(\phi, \vartheta)s(t) + n_i(t)$

$$y(t) = \sum_{i=1}^{N} w_i x_i(t)$$



Using vector notation:
$\boldsymbol{x} = [x_1(t), x_2(t) \ \ldots, x_N(t)]^T$ and
$\boldsymbol{n} = [n_1(t), n_2(t) \ldots, n_N(t)]^T$

$$y(t) = \mathbf{w}^{\mathrm{T}}\boldsymbol{x} = \mathbf{w}^{\mathrm{T}}\boldsymbol{a}(\phi, \vartheta)s(t) + \mathbf{w}^{\mathrm{T}}\boldsymbol{n}$$

And the power of the output signal:

$$p_y = \langle y(t)y^*(t)\rangle = \left\langle(\mathbf{w}^{\mathrm{T}}\boldsymbol{x})(\mathbf{w}^{\mathrm{H}}\boldsymbol{x}^*)\right\rangle$$

$$p_y = \mathbf{w}^H\boldsymbol{a}^*(\phi, \vartheta)\boldsymbol{a}^T(\phi, \vartheta)\mathbf{w}\ \langle s(t)s^*(t)\rangle + \mathbf{w}^H\langle\boldsymbol{n}^*\boldsymbol{n}\rangle\mathbf{w}$$