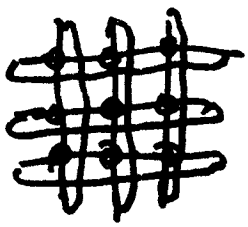
L17 - ECE669

diameter	$= d(K-1)$
Switch degree	$= d$
# pins/nodes	$= 2dw$
# links	$= d \cdot N = d \cdot k^d$
# nodes	$= N$
bisection	$= k^{d-1}$
channel width	$= w$
average distance	$= d \cdot \frac{k-1}{2}$
# switches	$= N$
routing delay	$= \Delta$



k-ary d-cube

k = 3

d = 2

- Cut-through network
- random comm. pattern.

$(\Delta + L)$ ← (wire delay)

$$T(N, n, d) = \underbrace{d_{avg} \cdot \Delta}_{L} + \frac{n}{W \cdot 1}$$

W - fix
N - variable
d/k - variable
n = ~~40~~ fix

$$T_{(d)} = d \cdot \frac{k-1}{2} \cdot \Delta + \frac{n}{W} =$$

$$= \Delta d \cdot \frac{\sqrt[d]{N} - 1}{2} + \frac{n}{W}$$

$N = k^d$

$k = \sqrt[d]{N}$

$$T_{(k)} = d \cdot \frac{k-1}{2} \cdot \Delta + \frac{n}{w}$$

$$N = k^d \Rightarrow d = \log_k N$$

$$T_{(k)} = \log_k N \; \frac{k-1}{2} \cdot \Delta + \frac{n}{w}$$