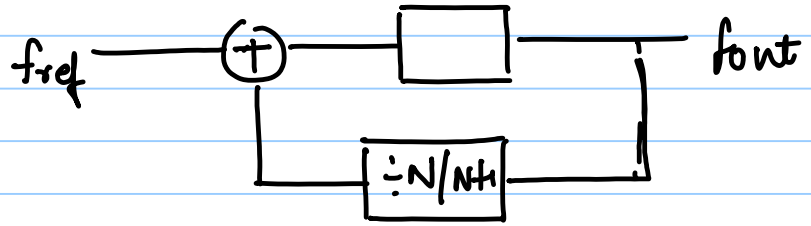
Note Title 12-11-2018

Lecture # 48

Fractional - N PLL

$0 < \alpha < 1$

$f_{out} = 4.25\, f_{ref}$ ✓ BT: $\left(122 + \frac{51}{492}\right) f_{ref}$

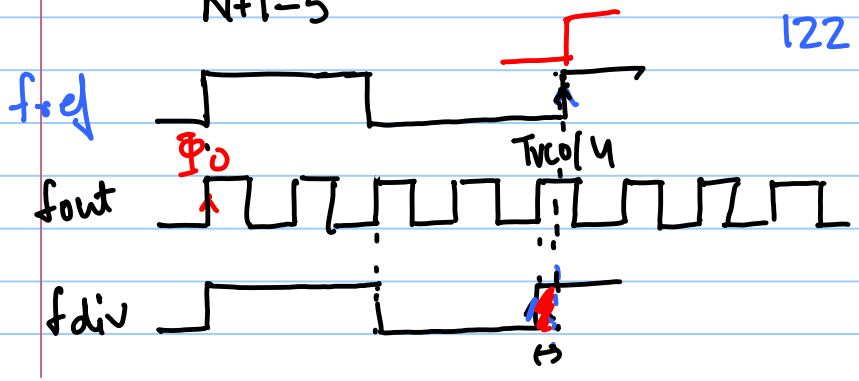


N = 4

N+1 = 5

123 x 51 Tref

122 x 441 Tref



$T_{ref} = \frac{425}{100} T_{out}$

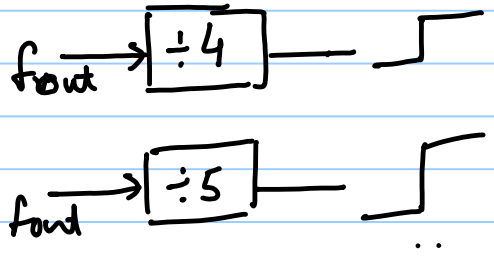
$4\, T_{ref} = 17\, T_{out}$

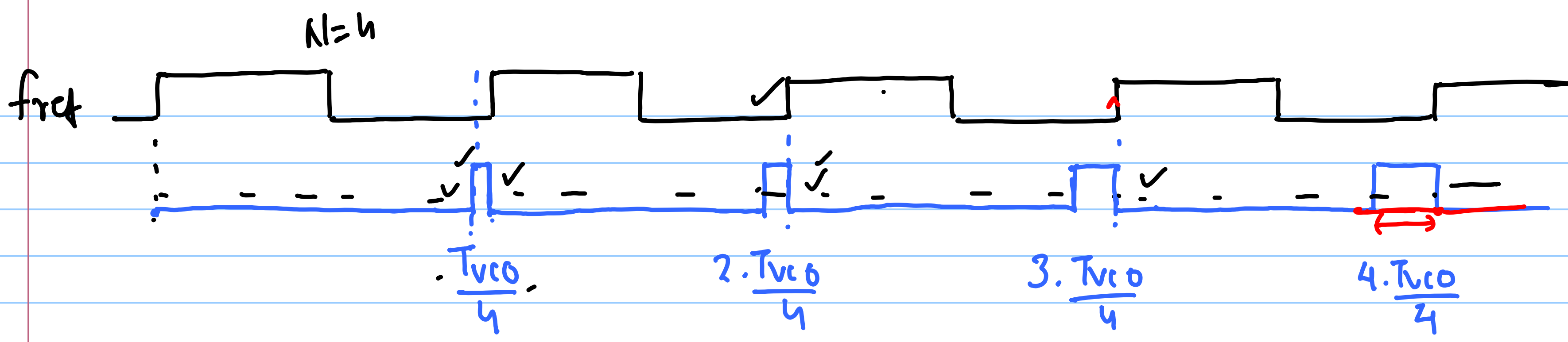
1 Tref — 4 Tout ✓

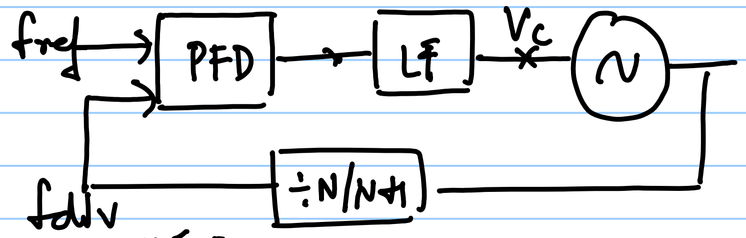
2 — 4

3 — 4

4 — 5





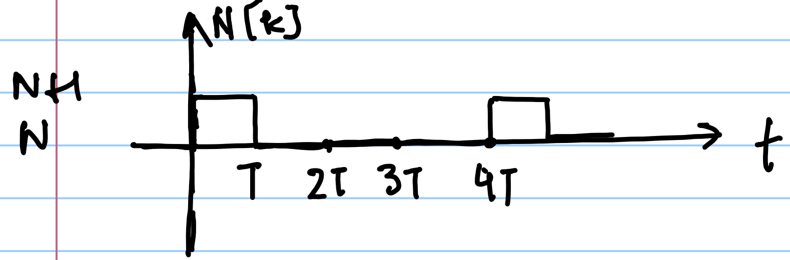


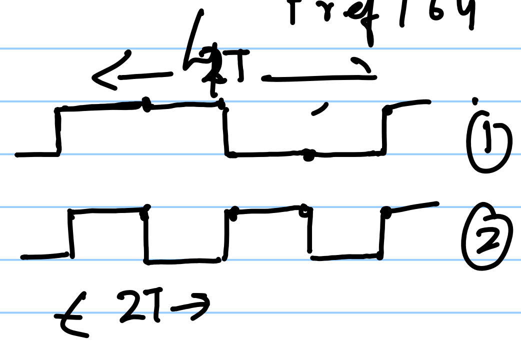
fout = 4.25 ✓ → fref/4 $f_{vco} \pm \frac{f_{ref}}{4}$

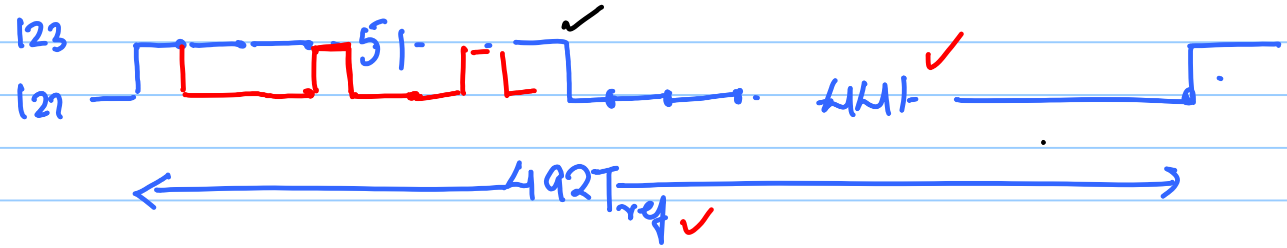
.125 fref/8

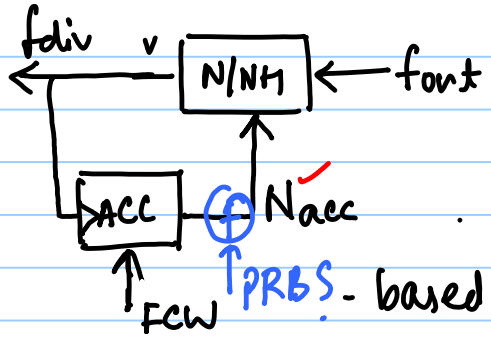
.0625 fref/16

.03125 fref/64 $f_{vco} \pm \frac{f_{ref}}{64}$





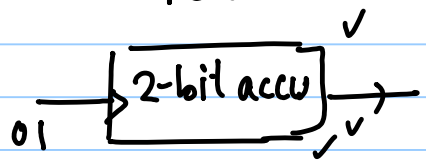


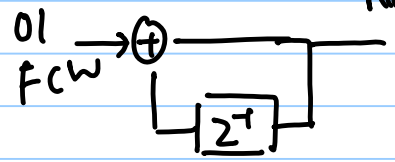


$f_{out} = 4.25\ f_{ref}$

FCW = 0.25

PRBS - based dither





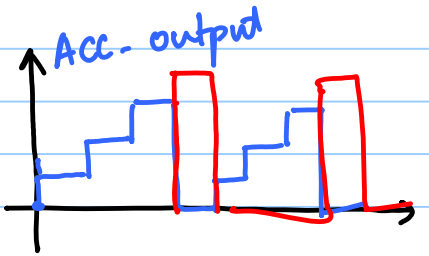
Nacc 0 0 1 0

01, 10, 11, 00

01

11 | 00

Carry = Nacc: 0 → ÷4, 1 → ÷5



$\frac{1}{228}$ $4 + \frac{1}{228}$

FCW = .0000 0001

1

$\frac{1}{2}, \frac{1}{2^2}, \ldots \frac{1}{2^8}$

Roll-over accumulator

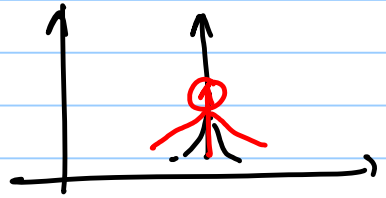
010, 110, 1001, 100

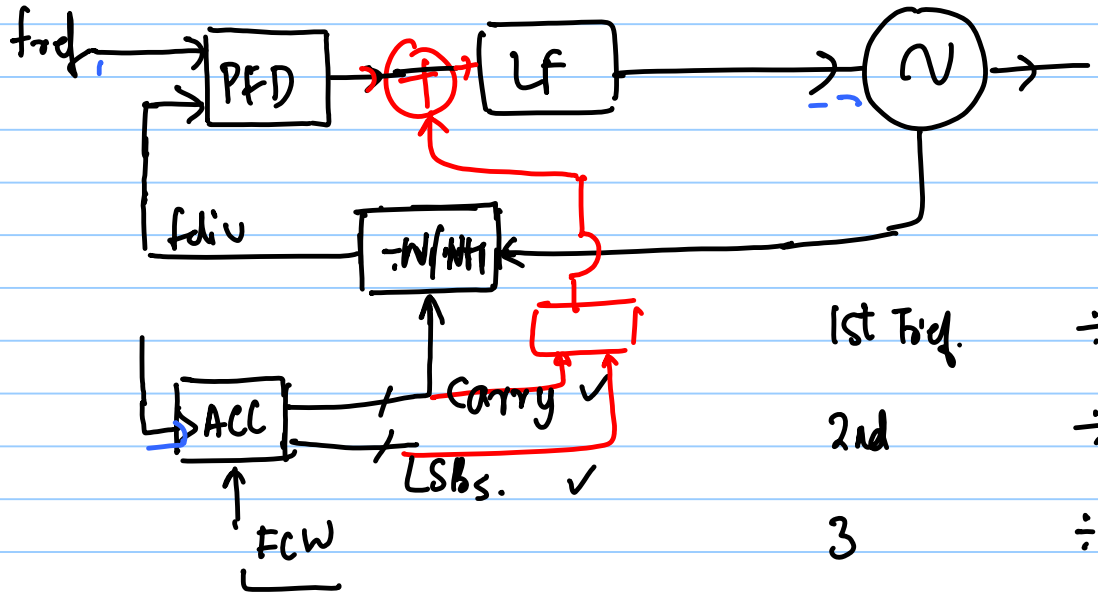
LSB

Div-by- 4 4 4 5 4 4 4 5 4 4 4 5 . . .

PRBS →

4 4 5 4 5 4 4 4 .





1st Trig.	÷ N
2nd	÷ N
3	÷ (N+1)

$f_{out} = (N+\alpha) f_{ref}$.

$T_{ref} = (N+\alpha) T_{out}$ ✓

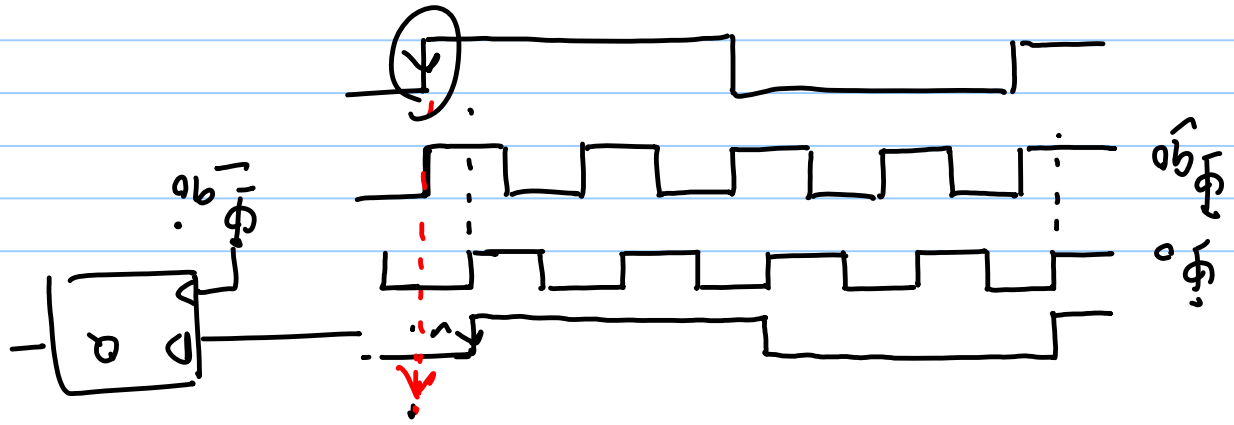
Phase error = $-\alpha T_{out}$

$\phi_e = -2\alpha T_{out}$ ✓

$\phi_e = (3N+1) T_{out}$ ✓

$- 3 T_{ref}$.

$= (1-3\alpha) T_{out}$


D
Q
$\bar{\phi}_0$
ϕ_0
$\bar{\phi}_{90}$