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Electronic System Design
Lect 1.x Examples of System Design:
System or Component??
Dr Duncan Bremner
WORLD CHANGING GLASGOW

The secret to good system design

1. **Understand the application**
   - WHAT is the customer /user trying to do?
   - WHERE is the customer /user trying to do it?
   - WHAT accuracy/precision /units is required (10s,1V, 10uA, 10ps…)
2. **Take a holistic (wide) view of the problem**
   - Do not ‘rush’ to a solution; spend time UNDERSTANDING
   - Try to consider several different approaches to the problem
3. **Approach the problem systematically**
   - Use the ‘V’ Model
   - Document your decisions: If you discover you were ‘wrong’ you can change the decision and try again.
   - Always consider HOW you will **VALIDATE** and **VERIFY** the results

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How to assemble the parts…

We can all access the same parts… the difference is how we use the parts to meet the customer need.

In ESD, interfaces are key…

1. Signal Source: Could generate voltage, current, charge, resistance (change of)…
   - Question: what Specification describes the input signal?
2. Signal Preconditioning: Amplifying, Filtering (shaping), frequency shifting, limiting…
   - Question: what Specification of output is needed?
3. Perform Operation: Could be analog or digital:
   - Question: what Specification / accuracy / precision is needed?
4. Output Driver / Conditioner: What is it driving? Specification?
5. Output Stage: What is interface for output (current drive, voltage drive, fast, slow…) Specification

A good systems engineer knows their interfaces… as well as internal block functions!!

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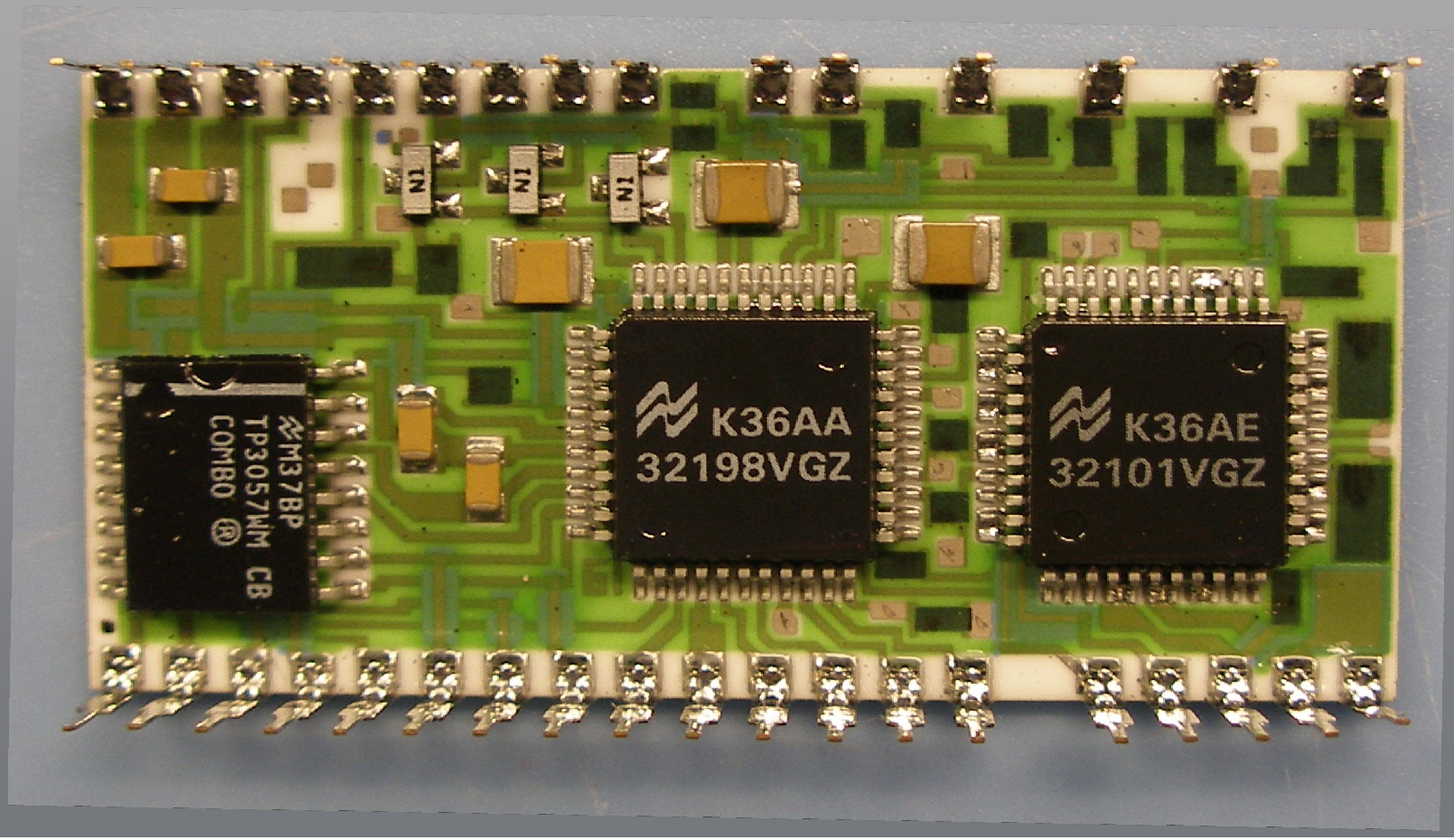
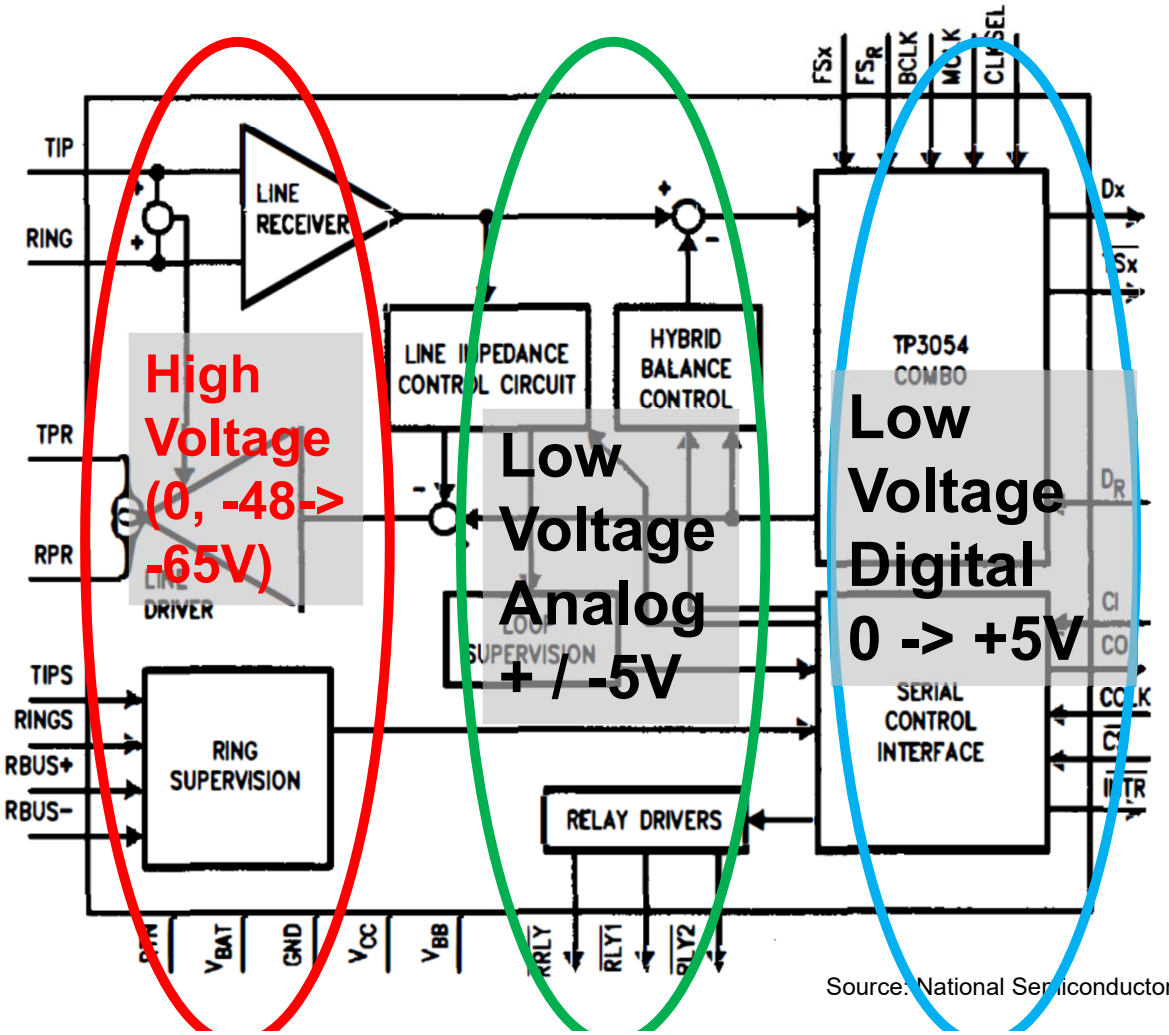
Typical Electronic System (Analog)



Simplified System Block Diagram

TP3210 (SLIM)

- Telecoms Subscriber Line Interface Circuit (SLIC)
- Millions sold in China in 1990s to connect analog telephones to network (before mobile)
- Every city had a Central Office that connected to up to 3Million telephones



Source: National Semiconductor TP3210 Datasheet

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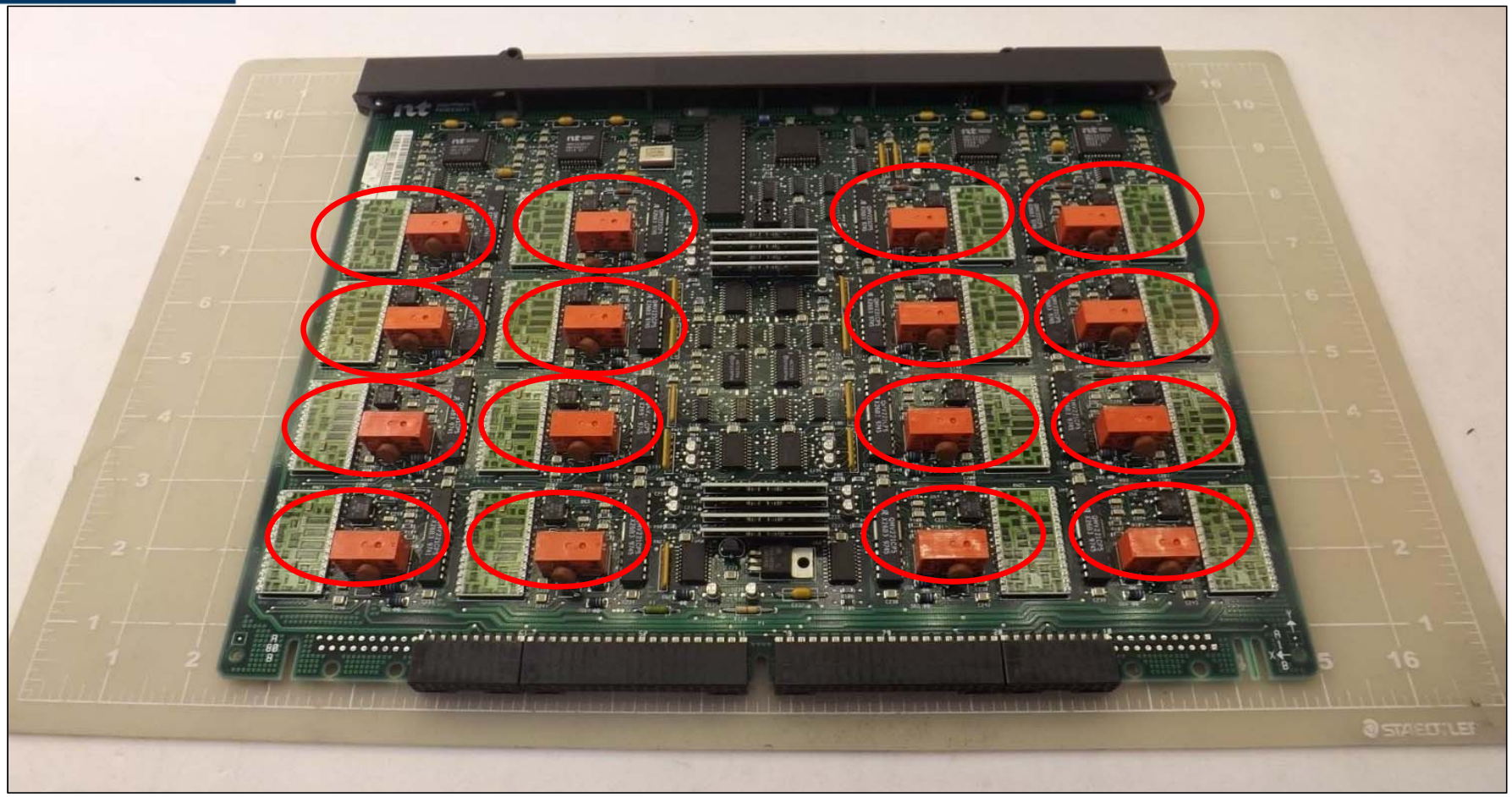
A board containing many ‘systems’



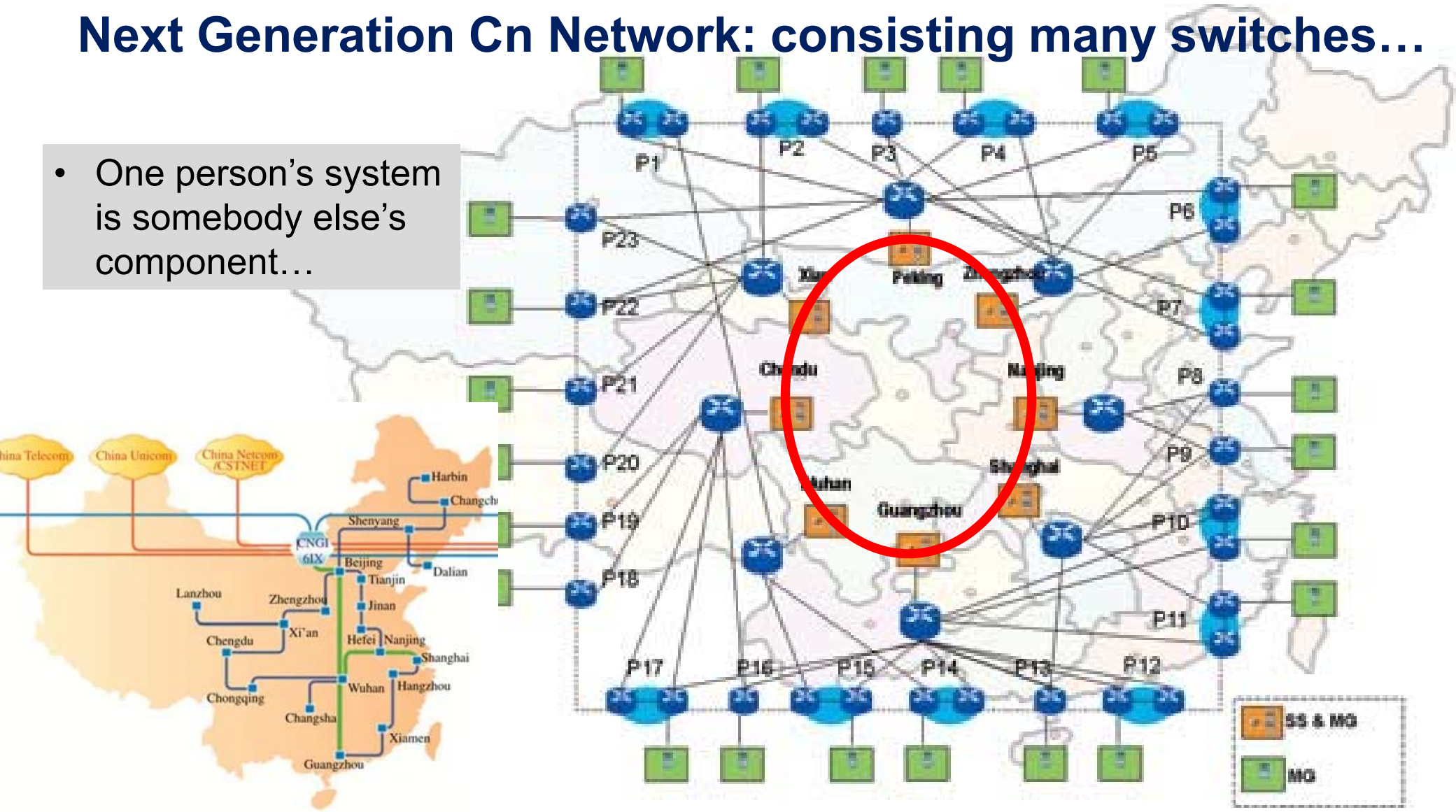
A telephone switch containing many ‘boards’

- Large telephone ‘switches’ could accommodate up to 3M subscriber lines (telephone lines) on boards

- A city like Chengdu might have several large switches connected to the digital network

Next Generation Cn Network: consisting many switches…

- One person's system is somebody else's component…



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Groups of 4
10 minutes

Class Exercise

Working in groups of 4, discuss whether the following are systems or components…

1. A wireless microphone or Headset
2. A mobile phone
3. A fighter jet
4. An aircraft Carrier in the Chinese navy
5. A Hospital

Component ?	System ?

Write down who you think calls it a component and who thinks it is a system

(e.g. Laptop: User thinks it as a component, Intel think it as a system)


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Thank you
谢谢
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